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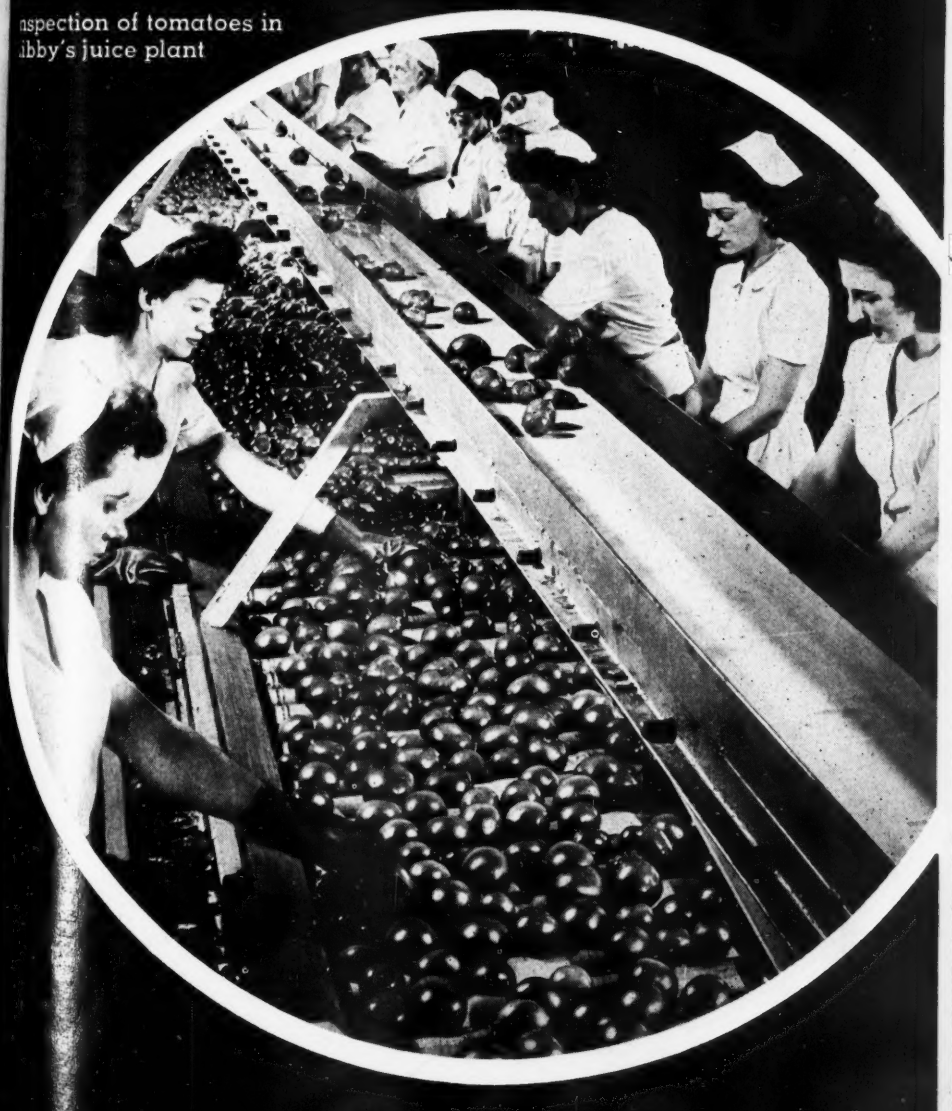

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ibby's juice plant

JULY 1945

What Technologists Mean to Processors

18 Mistakes Made In Using Lecithin

Treating Peaches With Ascorbic Acid

Why Canned Citrus Juices Deteriorate

How to Control Bin Dryers

Brine Control Improves Quality

Glue Palletizing Cuts Costs

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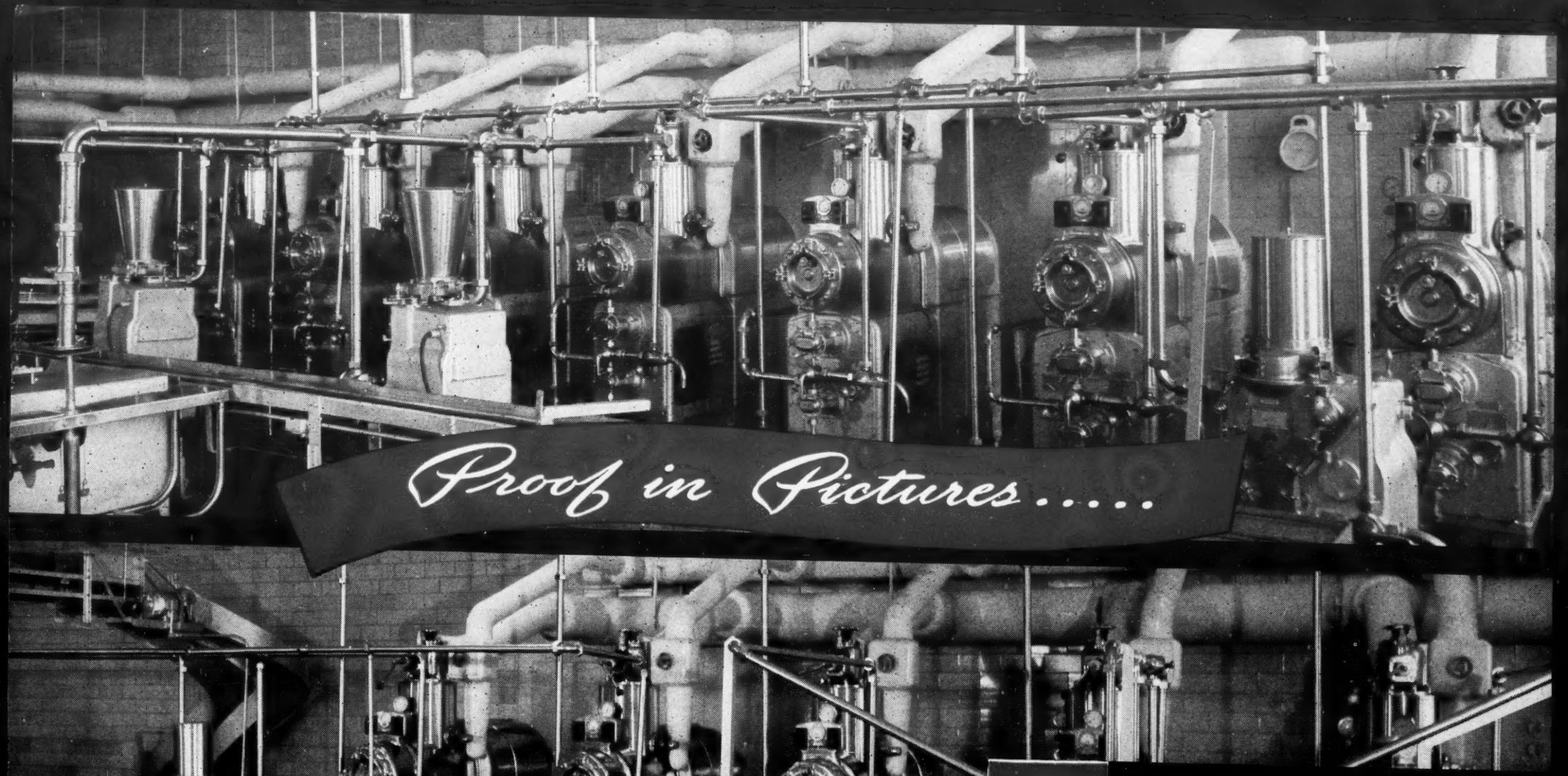

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Careful inspection of the raw material is an important quality control operation in the tomato juice plant of Libby, McNeill & Libby. The tomatoes move slowly along a conveyor while trained workers watch closely for any that fail to meet the exacting standards. Rejected tomatoes are removed and placed on upper conveyor belt.

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Market Research Analysis of Jobs

AN impressive study of the problems of jobs for everyone who wants to work when the war is over was recently made by a market research director. First: how much we can produce in this country? Second: can we sell all this production without a big export business to dispose of what we cannot use ourselves?

If 57 million people have jobs in the post-war period, we can produce a $200 billion economy provided the average production is $3,500 per worker per year. This figures out at about $11.22 per worker per day for a 6-day week and about $13.46 per day for a 5-day week. Wartime production has been close to $4,000 per worker per year. The argument runs that if the nation with overtime can produce $4,000 per worker during the war, surely we can produce $3,500 per worker postwar without overtime. This is the measure of the buying power of the nation with 57,000,000 persons earning money and receiving today's basic pay rates without high overtime payments. Our economy in 1929 was at the $100-billion level.

Can we spend it all? Obviously if we are to continue at this rate, whoever gets the money must spend it for consumer goods and services or for capital goods and services. Otherwise, the economy will run down.

Civilian goods and services account for the lion's share of the total economy of this or any country. In 1944, our civilian goods and services amounted to about $97 billions, which includes a 29 percent price increase over the figure for 1939.

How much goods and services will consumers alone have to buy to maintain a $200-billion economy in the postwar period?

The answer has been calculated to be $145 billion. This is double anything the public ever bought before. Is it possible for people to spend that much?

Proponents of the theory believe it can be done, and with reference to the food industry, the figures that follow have been uncorked. Before the war began, the median income (an economist's term) per family was $25 per week. Now it is $50 per week. Before the war (1941 is the last prewar year) the $25-a-week family spent $400 a year on food, but the family on $50-a-week spent $695 for food, a 74 percent increase. On the basis of that increased consumption, now made possible by a $50-a-week median income, the following rather startling conclusions were reached. The 1940 (latest census figure) wages for 1,310,000 workers in the food industry, amounting to $1,761 million could be upped to $3,100 million and 340,000 additional workers could be taken on at present wage levels, bringing the total postwar employment of the food industry to 1,650,000 persons without increasing the cost of the food to the consumer above today's prices! The average wage for workers in our field is now about $1,900 per year, compared to about $1,300 in 1940, and the foregoing calculation assumes that the postwar wage average would remain at the $1,900 level.

If reconversion from war industry to peace industry proceeds rapidly and without any interruption of wage payments, if people spend their money freely, if management is convinced of the need of continuation of high wages and thereby of sharing the rewards of industry with workers, it will be possible to approach the high-level economy that will come nearer to providing jobs for all than any other conceivable scheme.

IT IS pertinent to note here that many a manufacturer who has been renegotiated down to modest unit prices has later learned that he has made a very satisfactory profit simply because his overhead has been distributed over a much larger volume.

Doubts about the practicability of this plan center around two major points: (1) Will we be able to convert from a war to a peace economy without getting into an unstable economic situation? (2) Will we have a society wherein we can achieve full production activity and economic stability? Our previous experience has been a cycle of booms and depressions.

One must keep in mind that uncertain factors are involved. First, how many people will work under full employment? To answer that one must know (1) Amount of residual unemployment, (2) number to be kept in armed services, (3) how many of the 6 million additional wartime employees, chiefly women, oldsters and youngsters, will continue to work? Second, what will be the production per manhour on peacetime products?

Then there is the question as to how much of his income the postwar worker will spend. There are other questions, too, but these will give you the idea.

Although the foregoing calculations look like a perfect case for higher prices—even inflationary prices—it must be recognized that only higher productivity per man can justify higher wages. Anyway, the problems of the future are too awfully serious to permit easy dismissal of any optimistic plan.

If the plan is ever to be given a trial it must have a favorable and enlightened attitude from the press and the entire public.

The man who made these calculations is Mr. Arno H. Johnson of J. Walter Thompson, advertising agency. He deserves credit for imagination and courage.

L. V. Burton EDITOR

The Talk of the Industry

• MATERNITY leaves with accumulating seniority and guaranteed return to former jobs is what the Women's Bureau of the U. S. Department of Labor wants in the way of protection for lady workers, a lot of whom are used in food plants. So enters the stork to further complicate labor problems.

• INTERESTING new sources of high-protein foods are being developed in this country to help meet food shortages in liberated countries. There is a canned "meat" containing some ingredients which ordinarily go into tankage. Then there is a canned fish product made from what formerly was waste in salmon canneries.

Food technologists can perform an important service to the starving peoples of the world by developing more products of this type. The formulas may not appear appetizing to us, but to millions of Hollanders, to take one example, it would be manna from Heaven.

Yeast and soybeans still represent almost virgin territory for the development of emergency foods.

• AN official in a position to know what is going on talks very convincingly of important developments in food distribution methods which will revolutionize some past practices and make things pretty tough for those who do not keep up with events. This gentleman refuses to be pinned down to definite details, but he has in mind such things as low-cost air transport and new know-how in packaging fresh foods. It could be that he is overenthusiastic, because experimental results are not commercial achievements. But what can one lose by keeping an eagle eye on postwar developments and evaluating possibilities with an open mind?

• WANT to save sugar? A South Carolina candy manufacturer is said to be getting by with only 20 percent of the sugar he formerly used by putting sweet potatoes into fudge. The confection is claimed by those who are in a position to be slightly prejudiced to be a creamy brown product with little of the sweet potato flavor and which is hardly distinguishable from fudge made with sugar.

• UNRRA, on the authority of Director Herbert H. Lehman, has no plans for feeding the Germans. And what may please you even more, indications are that food will be taken from the British and American occupied areas of Germany to feed starving people in the countries overrun by the erstwhile Superman. It worries no one, except the Germans, that these areas normally have a food deficit. The area to be occupied by the Russians is a food-surplus area, but we think the Russians can be depended upon to correct that.

Who said something about a soft peace?

• SHIPMENTS of quick frozen milk to hospital ships have been stepped up to about 30,000 pints a month at the demand of soldiers for fresh milk on the long voyage home. Some also is going to overseas hospitals, while 400,000 pints a month is shipped to armed forces in cold and practically cowless Alaska. A mundane thing, fresh milk—when one has plenty of it.

• U. S. Conciliation Service reported that, during April, it amicably disposed of 1,921 labor disputes involving 1,476,000 workers. Of these, there were 152 cases affecting 38,857 workers in the food industries.

Our huge industry, with more than 40,000 plants, had only 7.8 percent of all the cases in dispute and a mere 3 percent of the workers involved. Can it be that the food processors are doing a better than average job at employee relations, or haven't the labor organizers yet obtained a good grip on food plant workers?

Hors d'Oeuvres

• *The food market is shifting New York's restaurants now serve 8,000,000 meals a day, compared with 3,000,000 before rationing began. So the question now is, how much should you pack in the king size can for institutional business and how much in the queen size for the housewife.*

• Sugar is used to make alcohol and alcohol to make explosives. When a 16-in. naval gun is fired, 36 gal. of alcohol goes in a flash. The sugar you're short of is being supplied to Private Sukyaki in a way that's very sweet.

• *Former Congressional Food Investigator Anderson looks like good Secretary of Agriculture timber. But come to think of it, President Truman has put him where he has to put up and shut up.*

• You can take it or leave it, depending upon your particular professional interests, but some people are buying butter as a substitute for oleomargine.

• *Now Armour has to pay employees for the time spent in changing into and out of their working clothes. If this thing keeps up, there's going to be a booming postwar business in zippers.*

• Consumers are reported by the government to be spending a record low percentage of their income for food. And if the food shortage gets much worse they'll be spending practically nothing.

• *The Nazis planned to reduce us to a slave nation of nonaryan farmers by removing all people of "German" ancestry and transporting our industries to the Reich, lock, stock and barrel. Well, they achieved the lock, stock and barrel part, with bayonet attached.*

• The food situation is so bad that some people say the nation is going to the dogs. If it does, we hope there's plenty of mustard.

• *Out in Seattle, an engineer has developed a one-man helicopter which he calls a "hoppicopter" and which is strapped to the back of the individual. A two-cylinder, 20-hp. engine rests on the flyer's shoulders and provides the motive power. Just the thing for stealing watermelons.*

• Yes, the comestible situation is getting so bad that when a man on a ladder dropped his paint brush and yelled "duck," a line formed on his right.

• *OPA's idea of making women who get extra sugar for home canning sign a pledge that they will not use that sugar for any other purpose makes one wonder if anyone ever told the boys in Washington the facts of life.*

F. K. L.

Technological control over the quality or the uniformity in composition of a food product starts in the chemical and bacteriological laboratories, as does the research development of new products or new ingredient materials.

WHAT TECHNOLOGY MEANS To Cereal Processors*

Technologists pay off in material selection, process supervision, quality control, new developments, sales and legal assistance and management. As told here, the "why" is packed with ideas and inspiration for other food processing industries

By F. N. PETERS, Director of Research, The Quaker Oats Co., Chicago, Ill.

NECESSARY to the understanding of our interpretation of the rôle of the food technologist in the field of cereal processing is our definition of who is a "food technologist" and what is the "cereal industry."

In our thinking, a food technologist is any person who applies scientific knowledge, theories or methods to the solution of any problem arising in connection with the activities of a company chiefly engaged in the manufacture of food products. In the light of such a definition, a technologist might be working on nonfood products and still be defined as a food technologist. Such a definition and its interpretation must be accepted if the food technologist is to measure up to the major rôle that is open to him rather than be content with the minor rôle in which he has too often functioned.

We find definition of the cereal industry somewhat difficult. One large cereal processing company manufactures plastics from soybeans, obtains vitamins from fish oils and has announced its intention of making household utility items postwar. Many cereal processing companies produce core flour for foundries and special starch adhesives. Another large cereal concern has a packing plant for horse meat, operates a chemical plant for furfural (of vital importance to synthetic rubber and lubricating oil production) and also makes vitamin-rich tablets from cereal grass.

In view of such facts, the cereal industry shall be considered as that group of companies whose main source of revenue comes from the sale of cereal products. Further, it will be assumed that the industry actually commences on the farm and that its responsibilities do not cease until its products have found acceptance in the American home.

Must Convince Management

Cereal food technology is relatively young and, such as there is, has frequently been forced on a reluctant management. This is not the fault of management, because it must be remembered that this industry started at an open hearth where stone-ground grain was mixed with water, formed into cakes and placed on hot stones to bake. This industry is hoary with tradition. Millions of barrels of oatmeal, flour and cornmeal had been made years before the term "food technologist" had been invented, and millers were making money while chemists were still "alchemists." Frequently, young

*Based on a paper read before the March, 1945, meeting of the Chicago Section, Institute of Food Technologists.

technologists become impatient with a management which is not all agog over the latest scientific theory or is reluctant to spend $2,000 for a farinograph, spectrophotometer or some other gadget. If the food technologist has a rightful place in the cereal processing industry, it is up to him to so conduct himself that management cannot fail to see that there is need for science in the industry.

Probably the most effective way to bring the value of scientific methods to the management's attention is by applying such methods to solve difficulties which every miller recognizes. For example, we well know that wet corn will mold or ferment if stored for any extensive period of time. Without technology, the miller can only guess whether corn is too wet to store. With technology, this guesswork is largely eliminated. The fat acidity of corn likewise is a measure of the liability of spoiling. Therefore, by measuring moisture and fat acidity, the technologist can determine whether a particular lot of grain is suitable for storage. And upon the accuracy of these determinations depends the safekeeping of millions of dollars worth of grain. Services such as this are understandable to management.

Testing Materials—Even Coal

Some wheats are best suited for making bread flour, others make better cake flours and some require blending with other wheats to be used at all. Not even the most experienced grain buyer can tell merely by looking at a sample how good it will be for a specific purpose, but the technologist with a small experimental mill can determine its value by actually milling a few pounds and subjecting the flour to baking tests. Today, the majority of milling wheat is purchased only after the grain buyer has received a report from the laboratory.

There is a definite correlation between the protein content of wheat and its value for baking. The price of the grain often varies directly with its protein content.

Grain which, as far as protein and moisture are concerned, is entirely suitable for milling may actually be unsatisfactory because it contains an abnormal amount of weed seeds. It may be heavily contaminated with fungous disease or weevils. It may have been damaged by heating during previous storage. For these reasons, every car of grain must be inspected before it is taken into the mill, and this inspection is generally under the supervision of the chief chemist. Therefore, the first responsibility of the technologist is the control of raw materials through inspection, experimental milling and baking, and determination of moisture and protein.

In addition to the foregoing, the technologist may be called upon to analyze coal used in the boiler plant or to measure the alkalinity or oxygen content of boiler feed water. It may be urged that this is no function of a food technologist. But a cereal plant cannot operate without steam, and in the case of cooking corn grits for flakes the steam had better be reasonably pure or the final product will be inedible.

This routine control of raw materials is fundamental and sometimes monotonous, but the monotony can be alleviated by the alert technologist if he will try to correlate the quality of raw material with its origin. Grain from one area may consistently run higher in protein, fat or vitamin B_1 than an apparently similar grade from another locality. One hybrid corn may mill better for grits than another, and the same may be true for oats. All such observations can aid the grain buyer and contribute to better products and greater economy of operation.

Also, the technologist can attempt to utilize new grains or new varieties. He can encourage plant breeders to produce corn with a higher niacin content, wheat with more protein or oats which weigh more per bushel or hull easier. Much of this work must be done by State Agricultural Colleges, but aid and encouragement from the food technologist is necessary to get it started. Kinoa, a Brazilian grain, has received considerable publicity in the past few months. Other grains from Mexico and South America, dehydrated banana flour and similar specialty items are offered to cereal manufacturers from time to time. Within recent years, sorghum grain and waxy maize have become articles of commerce and offer many possibilities for cereal processors. The food technologist is usually the only individual in the company who intelligently can evaluate such new products

Process Control

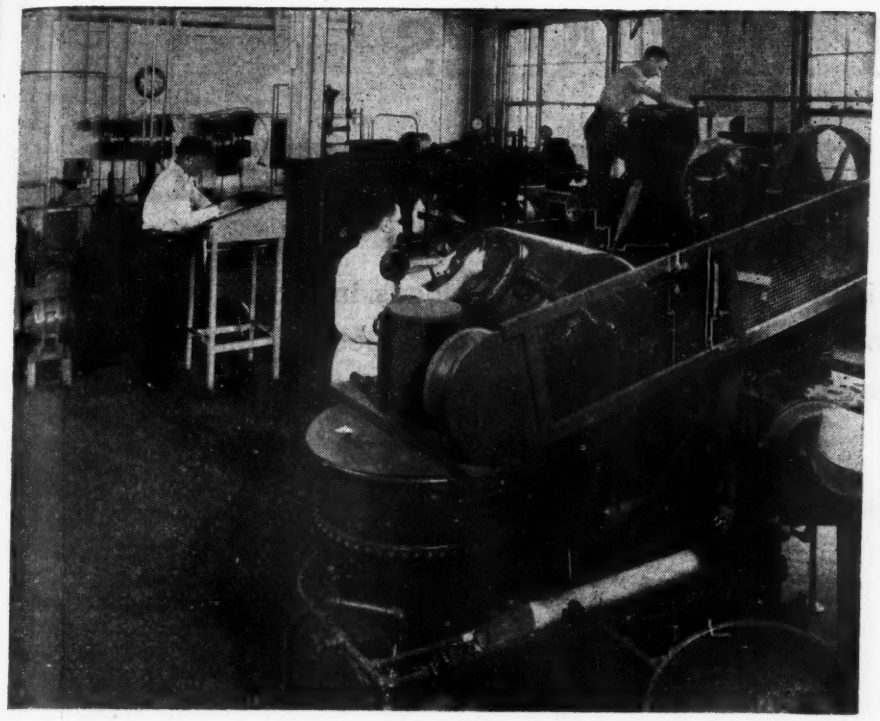
In every step of cereal manufacture, technological control must be exercised if a uniform product of high quality is to result. In flour milling, for example, moisture, ash and protein control are of the utmost importance. To the noncereal chemist, it may seem strange that there is a difference between a flour with a 0.42 percent ash and one with 0.44 percent ash, but woe be to the technologist who passes a "44 ash" flour to a customer who is paying for a "42 ash" product.

In the production of flour, moisture control is very important. If the grain is too dry, a "high-ash" flour is produced. If too wet, less flour is obtained from a bushel of wheat. Control of moisture is important in the manufacture of corn meal and grits and in the manufacture of rolled oats, corn flakes and shredded wheat biscuits. A treatise could be written on the subject of the importance of moisture in the processing of cereals.

Package Problems

A good cereal may be spoiled before it reaches the consumer because of poor protection against weevils, moisture or contamination from outside odors. Oats, farina and cornmeal need no protection from moisture, but they will pick up "board odors" if a substandard paperboard is used for packaging. Cereals, whose appeal resides largely in their crispness, need protection which can be given in a number of ways—such as with metal cans, resin-coated board, waxed glassine or sulphite, paraffine-coated board, moistureproof cellophane or combinations of these. But some cereals become rancid if not allowed "to breathe." So the proper amount of moisture protection must be given along with provision for breathing. Since package costs are a very large item in the retail price of most cereals, it is not always possible to use the best protection. In this case, some compromise between final cost and proper protection must be selected. The individual cereal technologist cannot hope to have a thorough knowledge of the properties of all available packaging materials. Yet he must know in general what is available and what it costs, and be ever ready to try new combinations. Once a packaging material has been selected, he may be called upon to test it for moisture permeability, wax or resin content or fat resistance. He may even be asked to determine the composition of the ink used in printing the container.

Within the past few years, the enrichment of cereals by the addition of synthetic vitamins has be-



Pilot plant production of a laboratory-developed food product permits correction of formula weaknesses, quality defects and/or production costs before an attempt at commercial-scale production is made.

come of importance. Governmental standards exist for enriched flour and farina. Eleven states have compulsory flour-enrichment laws, and similar bills are pending in 30 additional states. Five states have laws requiring vitamin enrichment of degerminated cornmeal and grits, and similar bills have been introduced in several other legislatures. Attempts are being made to establish standards for enriched macaroni. Thus, the food technologist must be familiar with the methods of addition and analytical technics for thiamine, riboflavin, niacin and, in special cases, vitamin D. To say that this is a headache is a gross understatement. In the first place, the methodology of vitamin analysis is in a state of flux. Until recently all vitamin measurements were based on animal feeding tests, but these are being discarded in favor of microbiological methods (another name for bacteria-feeding methods) and chemical tests. Great progress is being made, but most vitamin laboratories still preserve a very humble attitude regarding their ability to obtain satisfactory checks.

Obviously, the total vitamin in an enriched cereal is the sum of the natural plus the added vitamin. If the natural vitamin were constant, addition of a uniform increment of synthetic material to bring the product up to standard would be relatively simple. But the natural vitamin content of cereals may vary 300 percent. For example, Burkholder, McVeigh and Moyer *(Yale J. Biol. and Med.*, vol. 16, 659-63, 1944) report niacin variations in yellow corn from 11.3 to 36.3 micrograms per gram, in white corn from 12.7 to 29.4 mcg. per gram, and in sweet corn from 18.2 to 62.1 mcg. per gram. Therefore, the quantity of added synthetic vitamins must be constantly varied to compensate for the vagaries of nature. In spite of these difficulties, vitamins are added to flour, corn, wheat and rice flakes; farina; shredded wheat; puffed wheat and rice; and cornmeal and grits. In general, the enriched products have a reasonably uniform vitamin content. But there is growing evidence that some of these vitamins are unstable, so that even though the product meets the standards when it leaves the mill, its vitamin content may be below standard six months later. This may be solved by producing more stable synthetic vitamins, by different methods of application, by changes in packaging, by the addition of some stabilizer or by merely adding an excess of vitamins in the first place. The latter, however, is expensive and may cause the product to contain more than the maximum vitamin content permitted by the standards.

The subject of sanitary controls will be dismissed with a few words, not because it is minor but rather because it is so important and complex it cannot be considered adequately at this time. Close control must be exercised to keep the mill free from weevils, beetles and roaches. Grain cars are fumigated before loading, and each package of finished cereal must be tightly sealed so that no cracks offer an opportunity for insects to enter. Where cereals are to be incorporated with certain types of canned meat, the question if eliminating thermophylic bacteria from the grain has become of importance. In addition to these precautions, most large mills actually scrub wheat and corn to remove dirt. Occasionally, the question of the bacterial content of paperboard used in carton manufacture is considered. But because such cartons are used only with air dry materials, there is no evidence that the presence of bacteria in the paperboard is important.

Claim has been made that there has been no advance in the mechanical processing of grain in the past 70 years. Whether this be true or not, there is, no doubt, room for radical improvements in present-day milling processes. Consider the problem of flour manufacture. The wheat kernel from which the flour is made consists of an outer bran coat and several intermediate coats covering the endosperm or starchy portion which, when reduced to a powder, forms flour of the best baking characteristics. Near the end of the kernel is a small section high in fat, called the "germ." High-grade flour is free from bran and germ, but unfortunately it is almost free of thiamine and certain other valuable nutrients originally present in the grain. In addition, the yield of high-grade flour is poor, about 50 lb. being obtained from a 100 lb. of wheat. But even to obtain this inefficient separation of nutritionally inadequate flour an amazing number of corrugated rolls, smooth rolls, sieves, aspirators and conveyors is used To further complicate the picture, no two mills use the same equipment in the same way. One expert flour miller may be helpless in a strange mill until he has laboriously traced the hundreds of streams from their beginning to the finished product. This is strong presumptive evidence of the need for improvement in flour milling.

Part II, discussing additional parts played by technology in the cereal industry, will appear in August.—THE EDITORS.

18 MISTAKES IN THE USE OF LECITHIN

Lecithin can be employed to improve the quality of many foods, including confectionery and bakery products, cooking oils, fats, mayonnaise, peanut butter, sherbets and ice cream mixes. These "don'ts" will guide you in using it correctly.—Part I

By L. RUSSELL COOK
Vice-President, W. A. Cleary Corp., New Brunswick, N. J.

THAT we may better understand the why's and wherefore's of the mistakes made in using and handling lecithin, let us first consider briefly what it does, and how.

Lecithin finds many commercial uses because it is an antioxidant, is surface active and will reduce surface and interfacial tensions. Variable factors govern the extent of antioxidant protection provided by lecithin. These include the extent of unsaturation of the fatty acids in the glyceride, the absence or extent of hydrolysis of the lecithin itself and the quantity of lecithin present compared to the total surface area exposed by the fat requiring protection.

The important factors governing the effect of any given quantity of lecithin upon surface and interfacial tension reduction are as follows:

1. *The facility and speed with which the lecithin will dissolve in the medium in question.* The softer the lecithin, the more quickly and completely it will dissolve. This is important in commercial practice, particularly where unheated products are involved, such as bread doughs, cake batters and uncooked icings.

2. *The efficiency of the lecithin itself.* While concentration of phosphatides is a very rough indicator of efficiency, it is not conclusive nor accurate, because molecular structure and molecular efficiency are both variable. The more accurate means of comparatively evaluating lecithins is to measure their relative ability to reduce interfacial tension. One effective way of doing this is to measure the viscosity drop of a suspension of solids in fat, as caused by the graduated addition of the lecithin in question. The McMichael viscosimeter is a suitable instrument to use.

3. *The percentage of lecithin used compared to the total interfacial area present in the emulsion.* The lecithin molecule reduces the interfacial tension primarily because there is less force of adhesion between itself and an adjacent molecule of the medium than there is force of cohesion between adjacent molecules of the medium itself. It is also the case that the cohesion between two lecithin molecules is greater than the cohesion between two molecules of the medium.

It will therefore follow that the interfacial tension will be progressively reduced with increasing quantities of lecithin until a full monomolecular layer is provided at all interfaces. Further additions will provide a bimolecular or multimolecular layer, which, instead of reducing interfacial tension, will actually increase it. That is the reason, for instance, that the addition of 1 percent of lecithin to an oil will even slightly increase its viscosity, while the same lecithinated oil will produce a solids-in-oil suspension of lower viscosity than would the same oil without the lecithin.

NOW, THE MISTAKES —With Chocolate Products

1. One of the original errors made with lecithin in the manufacture of chocolate coatings and solid chocolate articles was its overuse. The accompanying illustration is a typical viscosity curve showing the rapid initial drop in viscosity with increasing quantities of lecithin; the approach of a "point of diminishing returns"; and the reversal in the viscosity curve when the optimum quantity is exceeded. Maximum quantities are usually about 4 oz. per 100 lb. for dark sweets and vanillas; 5 oz. per 100 lb. for light sweets and milk coatings.

The same error has been made by confectionery manufacturers who use lecithin to correct "mushing" in the enrober pot. Usually 1 to 1½ oz. to 200 lb. of coating in the pot will correct "mushing"; more is likely to aggravate it.

2. The most common error in the use of lecithin in chocolate manufacture is its addition at the wrong time. This statement must be modified by the objective desired, but if maximum viscosity drop per unit weight of lecithin is desired, it should be added after refining and conching are completed, and not before. Both refining and conching, the latter particularly at high temperatures, will destroy anywhere from one-third to one-half of the lecithin potency. The practice of adding part of the lecithin during mixing or at the beginning of conching time is useful in cutting power requirements or reducing—without detrimental effects on quality—the number of pounds requiring processing. This last item refers to the practice of omitting as much cocoa butter as possible until the viscosity is adjusted before molding, and using lecithin instead during the processing stages. Any of these practices are satisfactory for the particular objective in question. But it must be realized that the viscosity of the chocolate will not be stabilized under these conditions unless additional lecithin is used afterwards to compensate for the effects of the processing on the lecithin.

3. The use of 4 or 5 oz. of lecithin to each 100 lb. of ice cream coating is maximum insofar as obtaining minimum viscosity is concerned, just as in the case of confectionery coatings and solid chocolate items. For this reason,

the mistake frequently is made of stopping at this concentration of lecithin. The condition existing during the dipping of ice cream novelties and bars, however, is very conducive to the introduction of excessive quantities of moisture, which causes thickening of the coating to occur, with subsequent decrease in coverage, increase in weight, and tendency of the dipped article to "bleed."

While the 4 or 5 oz. of lecithin per 100 lb. is sufficient to reduce the tension at all interfaces existing in the coating prior to the introduction of the moisture, the latter creates new interfaces adjacent to the fat and also to the hygroscopic solids. When these solids absorb the moisture, they very naturally swell, increasing their own surface area. All of these tendencies are causes of increased viscosity. If an extra quantity of lecithin is present in the fats to emulsify the moisture in the fat alone, and to prevent imbibition by the solids, this viscosity rise can be minimized to that represented by the increased surface area created within the emulsion by the moisture. The amount of extra lecithin required to accomplish this objective is in ratio to the amount of moisture "added," but will usually vary between 2 and 4 oz. per 100 lb. of coating.

Sirups

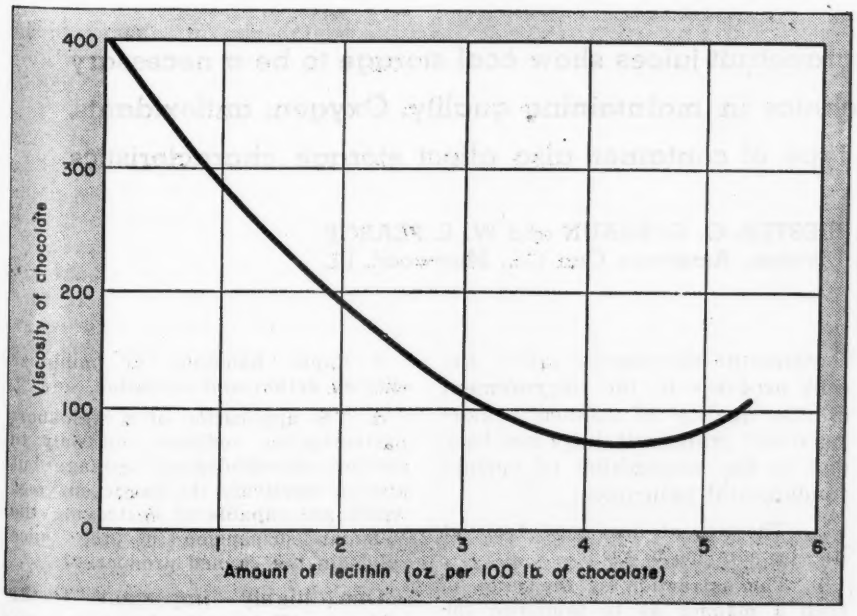
4. Lecithin has occasionally been labeled as an inefficient stabilizing or dispersing agent by sirup manufacturers who have unsuccessfully attempted to apply it to sirups, particularly chocolate, in which the only source of fat has been that contained in the cocoa powder or milk powder used. They are correct, as far as this application is concerned. It is a mistake to use lecithin in a sirup unless a fair amount of relatively "free fat" is present, either in the form of chocolate liquor, cream powder or actual added fat. In the latter cases, lecithin added to the fat or fat-rich substance will minimize (not eliminate) fat separation and create smoother texture in the sirup by virtue of good fat-globule dispersion. In sirups where there is practically no fat to disperse, the lecithin is wasted.

Lecithin is useful for dispersing the solids of powdered drinks during reconstitution, but in these cases the dispersing effect of the polar group of the lecithin molecule substitutes for the agitation and boiling during sirup manufacture.

5. In fat-bearing sirups, lecithin is usefully employed, as mentioned above, to assist in creating and maintaining adequate fat dispersion. The physical effect of this dispersion is a smoother texture and reduced separation. It must be remembered, however, that to accomplish this objective the lecithin must be permitted to operate at interfaces of which the fat is a part. Instead of adding the lecithin with the fat or fat-rich material itself, the mistake frequently made here is to add the lecithin at the wrong time, as follows:

a. Premixed with sugar, in which case the lecithin will operate at all aqueous interfaces, and not just those including the fat. Fat-solids interfaces would therefore be devoid of lecithin. Likewise, without overuse, there would be insufficient lecithin present to complement fatty interfaces in addition to fat-free interfaces. This is different from the application to ice cream mixes, where action at the aqueous interfaces is desired.

b. Just tossed into the boiling sirup. If all of the fat just happened to be pooled on the surface, this procedure would be successful. More likely, the lecithin would remain partially in little balls undissolved by the sirup, and partially dissolved in the water, which would have the same effect as premixing with the sugar.



Typical curve showing rapid initial drop in viscosity as quantity of lecithin is increased, the point of "diminishing returns" and the eventual increase in viscosity as the optimum quantity of lecithin is exceeded.

Bakery Products

6. The most common error made in the application of lecithin to bakery products is its use to replace or "save" shortening. This it will not do. The fallacy had a natural growth. It is known that in suspensions of insoluble solids in fats (chocolate, nonaqueous coatings and icings, and so forth), fat must be eliminated when lecithin is used if viscosity standards are to be maintained. It is then incorrectly assumed that the same is true in emulsions where moisture and dissolved solids are present as the continuous phase, as in doughs and batters.

Omitted in this deduction was the fact that lecithin operates at the aqueous interfaces just as it does at the fatty interfaces, with the result that the former are extended to the same extent as the batter. Another disregarded fact is that some of the values of shortening in bakery products lie in its actual bulk presence, and not entirely in its lubricating value.

Shortening adds certain definite qualities to bakery products; lecithin adds just as definite a series of qualities. But they are not the same, and neither will replace the other. The only point of overlap is in lubricating effect. The surface tension of fat will cause retraction of the fat from a portion of the surface area covered. Lecithin increases the nonaqueous surface area covered by the fat, and reduces the subsequent retraction from aqueous as well as nonaqueous interfaces. This is the result of the presence of the water-soluble polar group in the lecithin molecule, which serves to effectually lock fatty interfaces with water and water-soluble ones.

The subject of the difference in qualities attributable to shortening

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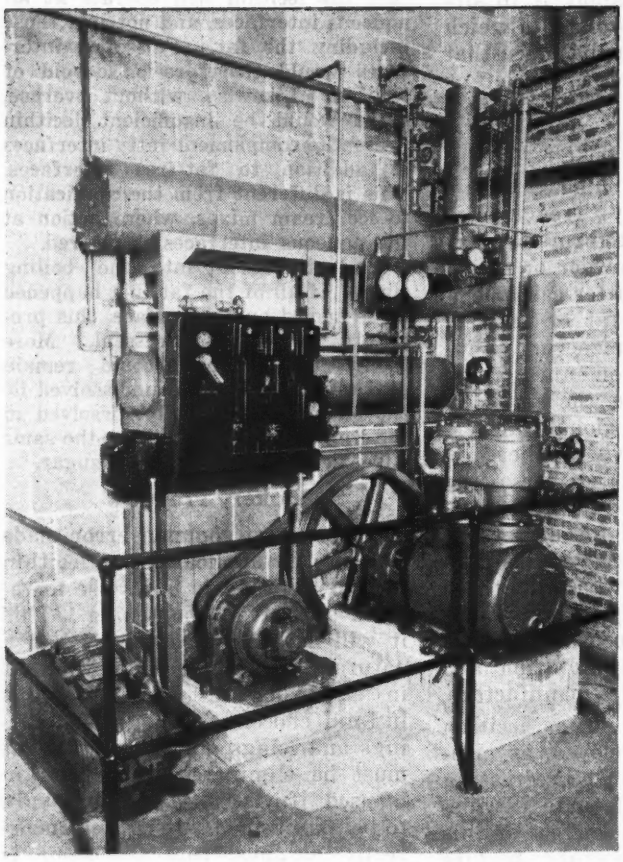

FIG. 1. Refrigerating equipment used for maintaining air-cooled storage consists of standard units and requires little space.

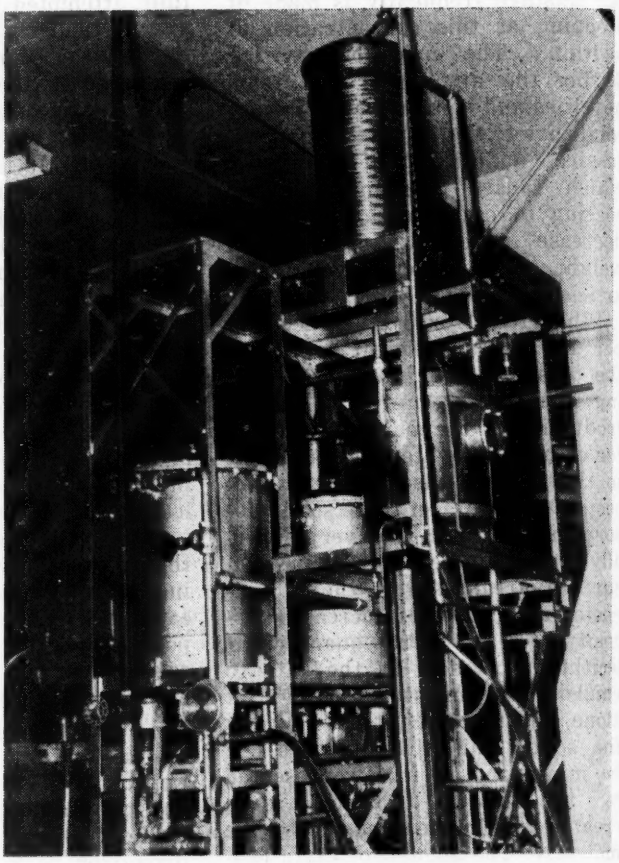

FIG. 2. Results of studies in pilot-plant units shown here pave the way for observations under commercial production conditions.

Why Canned Citrus Juices Deteriorate in Storage

Research on orange and grapefruit juices show cool storage to be a necessary adjunct to production technics in maintaining quality. Oxygen, antioxidants, sweeteners, peel oil and type of container also affect storage characteristics

By D. W. RIESTER, O. G. BRAUN and W. E. PEARCE
Research Division, American Can Co., Maywood, Ill.

OF all fresh fruit juices, orange juice is probably the most familiar to the general public. Consequently, no other canned fruit juice has been subjected to such a critical consumer comparison with the fresh product. Despite this fact and the labile character of the delicate orange flavor, the commercial application of canning procedures developed by many groups associated with the citrus industry has resulted in increasing consumer acceptance of the canned juice. Recent progress in the improvement of the quality of canned orange juice and grapefruit juice has been due to the recognition of certain fundamental principles:

a. The use of any good fruit at its optimum maturity.

b. The extraction of the juice in such a manner as to minimize the incorporation of bitter glucosides from the albedo and locular walls, and of oil from the outer peel.

c. Rapid handling to minimize enzyme action and oxidation, and

d. The application of a high-short pasteurization sufficient not only to prevent microbiological spoilage but also to inactivate the pectic enzymes which are capable of destroying the colloidal suspension of the juice solids in the canned product.[1, 2]

One highly important factor which, until recently, has been generally disregarded or inadequately controlled by the industry and dis-

tributors is the temperature at which canned orange juice and canned grapefruit juice are stored. Several experiments have illustrated distinctly that the maintenance of low temperatures in warehouses is essential to the marketing of good quality citrus juices. The rate of general quality deterioration is directly proportional to the temperature of storage.[3] At sustained temperatures in excess of 70 deg. F., the rate of deterioration increases quite rapidly until at temperatures of 90 and 98 deg. F. the deterioration is so rapid that it seems impractical to draw conclusions regarding the vitamin stability and other quality factors of commercially stored juices on the basis of storage experiments conducted at these temperatures. Storage at 40 deg. F. increases the retention of flavor, color and ascorbic acid (Fig. 3) as compared to storage at 70 deg. F.; however, the effect is not so great as might be expected. Even though the difference in the effects of the two temperatures is not pronounced, the lowest intermediate temperature which can be economically maintained should be used. Some packers have found a storage temperature of 50 deg. F. to be feasible.

The maintenance of a maximum warehouse temperature of 70 deg. F. merits the serious consideration of the citrus juice canning industry. The added expense of cooling a well-insulated building appears to be justified by the resultant increase in general quality retention in canned grapefruit juice and canned orange juice.

The authors firmly believe that the importance of adequately controlled low-temperature storage cannot be overemphasized. It is difficult to conceive of an improvement in production technic, even though revolutionary, the effects of which would not be largely nullified by high-temperature storage.

Recognition of the importance of this factor resulted from the field work done in Florida on canned orange and grapefruit juices. The work has been largely of a technological nature and carried on according to the following general procedure.

The experiments were designed to study the effect of several factors upon the quality of canned orange juice and grapefruit juice during commercial packing and during subsequent storage. Only Florida Valencia oranges and Marsh and Duncan grapefruit were used, and particular care was exercised in selecting the fruit at its optimum maturity. Whenever possible, the experimental packs were made on a commercial scale using standard commercial equipment. The number of variables introduced in each experiment was reduced to a minimum in order to facilitate the control of other factors.

All of the cans used were made of hot-dipped 1.5-lb. tinplate throughout. The samples were divided into two groups and stored at 40 deg. F. and at room temperature. The "room temperature" storage was maintained at approximately 65 deg. F. during the winter months but was allowed to rise within a few degrees of the outside temperature during continued warm summer weather. This type of storage at Maywood, Ill., when consid-

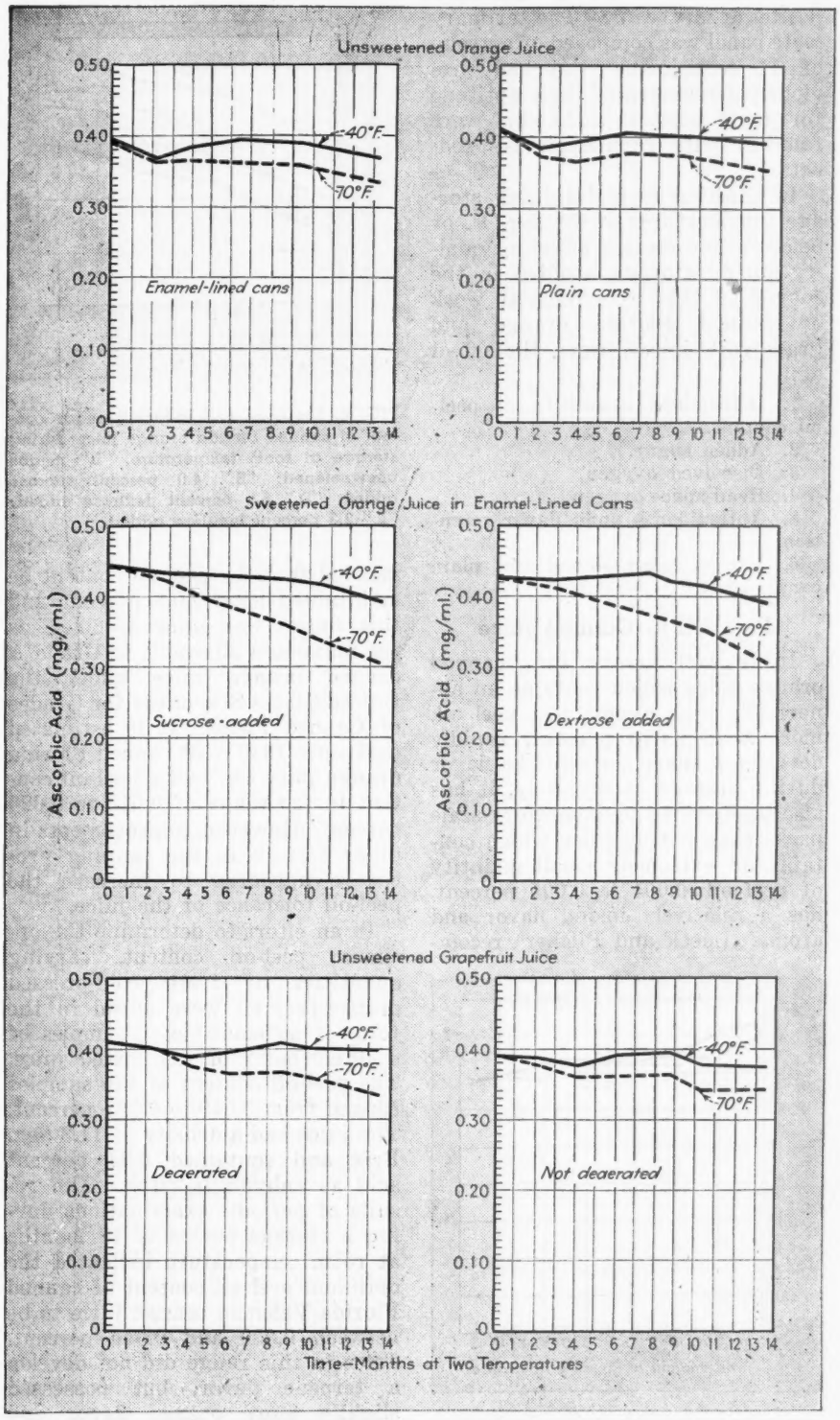

FIG. 3. Effect of storage temperature upon ascorbic acid retention in canned Florida orange and grapefruit juices. Analyses made by a modification of the method of Bessey and King.[11]

ered on a year-around average, is estimated to approximate sustained storage at a temperature slightly below 70 deg. F. Analytical and organoleptic tests were made at intervals of approximately two months.

Ascorbic acid was determined in triplicate on each of six cans representing each variable at each examination. Metals and sugars were determined in duplicate on a composite of six cans. The primary taste panel was composed of a group of 11 technicians who had previously demonstrated their aptitude for taste testing and who were familiar with canned citrus products.

In addition to maintaining storage temperatures at 70 deg. F. or below, other factors affecting quality during storage, studied in the course of this experimental work on canned Florida orange and grapefruit juices, were the effect of:

1. Determined quantities of peel-oil content.
2. Added sugar.
3. Dissolved oxygen.
4. Head-space oxygen.
5. Antioxidants upon flavor retention.
6. Use of enamel-lined and plain cans.

Peel Oil in Canned Juice

It is well known that canned orange juice which contains an abnormally high quantity of peel oil, more than 0.060 percent, rapidly develops a sharp terpene-like flavor during storage. Conversely, it has also been shown by laboratory-scale packs that orange juice which contains an extremely small quantity of peel oil, 0.001 to 0.005 percent, has a relatively inspid flavor and aroma. Lueck and Pilcher[3] recommended that the peel oil content be maintained below 0.030 percent, and this figure was later specified as the maximum allowable in Grade A canned orange juice under the United States Standards for Grades of Canned Foods. It is estimated that since 1940 most canned Florida orange juice has had a peel-oil content in the range of 0.010 to 0.020 percent. However, improvements in other factors in the canning procedure appeared to increase the peel-oil tolerance of the juice.

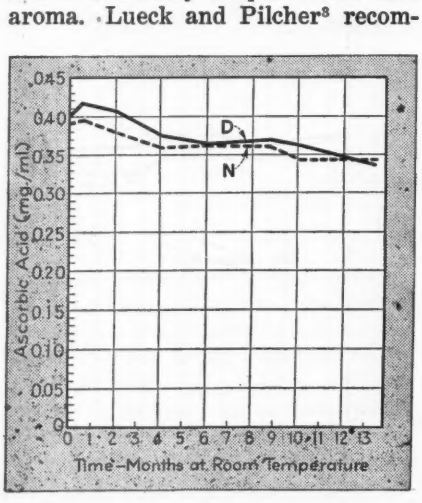

FIG. 5. Ascorbic acid content of unsweetened Florida grapefruit juice in plain cans at room temperature. "D" means deaerated; "N," not deaerated.

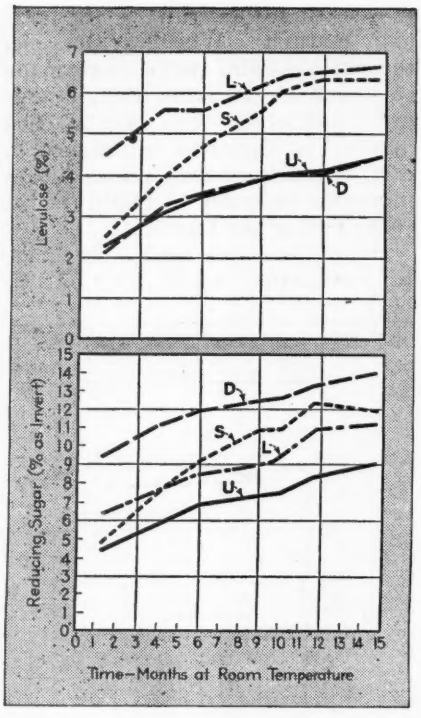

FIG. 4. Levulose and reducing sugar content of canned Florida orange juice during storage at room temperature. "U" means unsweetened; "S," 4.0 percent sucrose added; "D," 6.0 percent dextrose added; "L," 2.3 percent levulose added.

In an effort to determine the optimum peel-oil content, varying quantities of fresh cold-pressed orange-peel oil were added in the form of an emulsion to samples of a single batch of well-mixed juice. The peel-oil content of the samples ranged from 0.019 to 0.127 percent. The juice had a density of 11.3 deg. Brix and contained 0.94 percent acid as anhydrous citric. The results of periodic examinations during a storage period of 13 months at room temperature indicated the optimum peel oil content of canned Florida Valencia orange juice to be between 0.030 and 0.040 percent. Juice in this range did not develop a terpene flavor, but possessed slightly more orange flavor and aroma than samples containing less peel oil. Juice which contained more than 0.050 percent peel oil developed an objectionable terpene flavor within one month after canning. It might be expected that storage at temperatures in excess of 70 deg. F. would lower the optimum range of 0.030 to 0.040 percent indicated by these tests.

Effect of Sweetening

Cornell, Wells and Eguchi[5] found that, when levulose is present in sirup used as a packing medium for canned pineapple, it decomposes into products of dark color and strong flavor during extended storage. Willaman and Easter[6] also found that the decomposition of levulose contributed to the darkening of sorghum sirup and that the reaction rate increased at higher pH levels. These reports suggested an experimental pack to determine if a similar effect might be perceptible in canned orange juice despite its low pH and to study the effect of added sugar upon the flavor retention of the juice during storage. The original juice had a density of 11.0 deg. Brix and contained 1.1 percent acid as anhydrous citric. Dextrose is generally rated as two-thirds as sweet as sucrose, and levulose is considered approximately 1¾ times as sweet as sucrose in the percentage range of sweetened canned orange juice. Dextrose, sucrose and levulose were added to portions of the juice in these ratios in an effort to attain equivalent sweetnesses. Both of these ratios proved to be slightly low but not low enough to interfere appreciably with flavor comparisons. The levulose and reducing sugar contents of the juices during one year of storage at room temperature are shown in Fig. 4. These charts show the gradual inversion of natural and added sucrose to reducing sugar and levulose.

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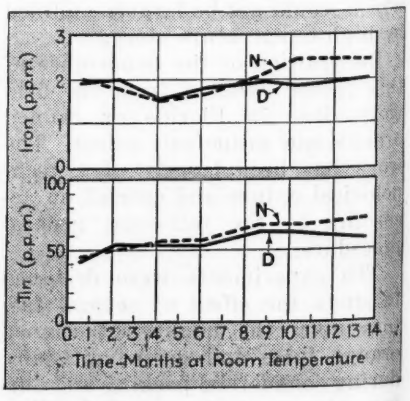


FIG. 6. Iron and tin content of unsweetened Florida grapefruit juice in plain cans at room temperature. "D" means deaerated; "N," not deaerated.

ADDING ASCORBIC ACID To Peaches Before Freezing

These step-by-step directions will make it easy for you to treat the sliced fruit so as to prevent browning after thawing. The authors also tell how to control the ascorbic acid content of the sugar sirup

By J. C. BAUERNFEIND and G. F. SIEMERS
Hoffman-La Roche, Inc., Nutley, N. J.

TREATMENT of cut fruit with ascorbic acid before freezing delays discoloration and flavor change after the fruit is thawed. So it permits the processing of well-ripened, highly flavored fruit. This method does not introduce foreign substances or unnatural flavors, as a small quantity of ascorbic acid is already naturally present in the fruit.

However, the use of added ascorbic acid as an antioxidant to retard discoloration, as well as its method of application, is restricted to certain fruits. This specificity also has been noted by other investigators.[1] Its use in processing peaches is discussed in this article.

Preparing the Fruit

Selected, firm, ripe freestone peaches are first lye-peeled by immersing them in a 1.5 percent lye (sodium hydroxide) solution (2 oz. per gal.) at a temperature of 180 to 210 deg. F. for 45 to 60 seconds. The lye solution may be varied from 1 to 2.5 percent, depending on the variety and maturity of the fruit, as well as the type of peeling machine used. The lye treatment causes the separation of the skin from the flesh of the fruit, so it should be applied to the extent of facilitating removal of the skin but not injuring the edible tissue.

After peeling, the fruit is thoroughly washed with water to remove the adsorbed lye, and some processors briefly dip or spray the fruit with a dilute solution of acid (such as citric acid, 0.5 to 2 percent) to neutralize the effect of the lye.

The skins of whole or halved fruit also may be loosened in a steam box or by immersion in hot water, thereby eliminating the lye treatment and subsequent washing. This method has some merit when processing clingstone peaches following halving and pitting. Whatever treatment is used, precautions should be taken not to soften the peach tissue excessively or permit the loss of the volatile and soluble constituents which contain the most characteristic flavors of the fresh fruit.

Whether the peaches are pitted by hand or by machine depends on the availability of the equipment and the condition of the fruit. Hand pitting permits segregation of the poor fruit.

Peaches for freezing are cut into slices varying in thickness from ¼ to over 1 in. The thinner, more flexible slices are preferred for filling into the small rectangular packages now most generally used for retail distribution.

Holding During Delays

It is highly desirable to move the fruit through the process as quickly as possible. But if it becomes necessary to hold peeled or halved fruit temporarily, it may be submerged in a 1 percent salt (NaCl) bath containing 0.1 percent of ascorbic acid (1 oz. per 7.5 gal. of salt solution). A 2 percent citric acid solution has also been recommended.

Preparing Sugar Sirups With Ascorbic Acid

Sugar sirup varying from 35 to 65 deg. Brix is used to cover the cut fruit, but the heavier sirups are more commonly employed to retard browning after freezing. While these heavier sirups may offer slightly more protection against oxidation, they tend to draw juice from the fruit tissue by osmotic exchange. When the fruit is well-ripened, it tastes better in a lighter sirup and the inclusion of crystalline ascorbic acid permits the use of that type of sirup.

Sirups of different concentrations may be prepared easily by referring to the Table I. Those desiring details on the preparation of sugar sirups are referred to the article by Jordan and Willis in the April issue of FOOD INDUSTRIES.[2]

It is recommended that ascorbic acid be added to the sugar sirup at the minimum rate of 150 milligrams per pound of finished pack (fruit plus sugar sirup). This holds when filling packages at the rate of 3 parts of sliced fruit plus 1 part of sugar sirup (for example, 12 oz. of sliced fruit plus 4 oz. of sugar sirup, by weight) or when filling packages at the rate of 4 parts of sliced fruit plus 1 part of sugar sirup (for example, 24 lb. of sliced fruit plus 6 lb. of sugar sirup). Table I will facilitate the preparation of the ascorbic acid-sugar sirups.

Example—What quantities of material are necessary to prepare 125 gal. of 45-deg. Brix sugar sirup which—when used at the rate of 12 oz. of fruit and 4 oz. of sirup (3 plus 1)—will supply 150 mg. of ascorbic acid per pound of finished pack?

125 x 4.51 = 563.8 lb. of sugar
125 x 5.52 = 690.0 lb. of water divided by 8.33 (at 68 deg. F.) = 82.8 gal.
125/100 x 21 = 26.3 oz. of ascorbic acid.

If the sugar sirup is already prepared, the correct quantity of ascorbic acid per 100 gal. of sirup may be dissolved in 1 gal. of water, carefully added to 100 gal. of sirup and stirred to obtain even distribution. The addition of this small quantity of water reduces the sugar

concentration of the sirup very slightly.

If the sugar sirup has not been prepared, 1 to 2 gal. of the water normally used in it may be held aside. Then the ascorbic acid can be dissolved in it shortly before the sirup is to be added to the cut fruit. It is advisable to boil the water to expel the air and then cool it before dissolving the ascorbic acid if the concentrated water-solution is to be made up an hour or two before its addition to the sugar sirup.

While crystalline ascorbic acid is easily added to sugar sirups before use, there are several simple rules to be observed:

1. Do not heat sirups containing ascorbic acid above 125 deg. F. Higher temperatures have a destructive action on the ascorbic acid.

2. Do not agitate sirups containing ascorbic acid excessively. Avoid long periods of stirring with a motor-driven agitator, as well as continued circulation through a pumping system, because ascorbic acid is fairly easily oxidized. This action is accelerated by the presence of minute quantities of dissolved copper.

The above possibilities are reduced to a minimum by adding the ascorbic acid to the sirup as shortly before use as is practicable, agitating sufficiently to get even distribution, and using up each batch of prepared sirup over a maximum period of one-half day's operation.

Determining Ascorbic Acid Content of Sugar Sirups

It is not necessary in a normal operation to determine the amount of ascorbic acid added to the sirup. But should an occasion arise when either the quantity of added crystalline ascorbic acid or the volume of sugar sirup to which it was added is questionable, the ascorbic acid content can be checked by the iodine-titration method.* The following equipment is necessary for this test:

a. One scale weighing in fractions of ounces.

b. One 50-ml. burette and support.

c. Three 12-oz. clear glass bottles with large mouths.

d. Standardized iodine solution (0.1 normal).

e. Starch solution.

The burette and standardized iodine solution (0.1N) may be obtained from any chemical supply house. The starch solution is prepared freshly every two to three weeks by boiling ¼ oz. of cornstarch in a quart of water and filtering it through cheesecloth.

Four-ounce quantities of sugar sirup containing ascorbic acid are carefully weighed into the glass bottles and 10 to 15 drops of starch solution added. The bottle is placed under the tip of the burette previously filled (including the tip) to the zero mark, and the iodine solution is added slowly, while shaking the bottle with a gentle rotary motion. When the addition of one or two drops of iodine solution changes the color to a permanent blue (the end-point), which is maintained after shaking, the correct amount has been added and a burette reading is taken. Then by referring to Table II, convert the titration value to milligrams of ascorbic acid per 4 oz. of sirup.

This table is primarily for sirups prepared from pure granulated sugar. If hydrolyzed sugar sirups or less refined sirups are used, it is advisable to titrate the sirup without the presence of ascorbic acid and subtract this value from the titration value of the ascorbic acid-containing sirup before employing the table.

Packaging and Freezing

After slicing the fruit, 12 oz. is placed in a suitable 1-lb. package, the fruit is flooded with 4 oz. of cooled sugar sirup containing ascorbic acid (3 plus 1), and the package is sealed for immediate freezing. If the sirup has been previously cooled, the freezing of the packaged fruit is hastened. After filling the package, all air should be carefully forced out of the inner bag by creasing the top just above the level of fruit and sugar sirup, preparatory to heat-sealing. By forcing the air out, a minimum quantity remains to attack the fruit, and the covering of all the cut fruit by the sugar sirup is further assured. The packaged fruit should be frozen immediately, or as soon as is practicable, at the lowest temperature available in the plant.

Large packages also may be filled by the sugar-sirup method. A 30-lb. package would require 24 lb. of sliced fruit and about 6 to 7 lb. of sugar sirup. At the rate of adding 150 to 200 mg. of ascorbic acid per pound of finished fruit, the 30-lb. package would require the addition of 4,500 to 6,000 mg. of ascorbic acid. The ascorbic acid may be added to the sirup as previously described. The sirup pack requires less sugar per pound of fruit than the dry sugar method and also permits the sugar content to be varied according to the sweetness of the fruit.

Ascorbic acid may be used to some advantage in the dry sugar pack, but not as effectively as in the sirup method. A 30-lb. package of fruit will require 4.5 to 6.0 g. of ascorbic acid. This quantity should be mixed with the last half-pound or pound quantity of dry sugar and spread over the top surface of the fruit before sealing the package, as the top layer of fruit browns more easily than the remainder of the fruit in the package.

The use of the sirup pack has the following advantages over the addition of dry sugar: The use of prechilled sirup permits more rapid freezing, air pockets are avoided, there is less bleeding of the fruit, and the finished package will withstand a higher temperature before thawing and during general handling.

References

[1]Donald K. Tressler and Clarence DuBois, *Food Industries*, vol. 16, 701, September, 1944.

[2]Stroud Jordan and Louis A. Willis, *Food Industries*, vol. 17, 392, April, 1945.

TABLE II—Titration Conversion Data.

Ml. of 0.1N iodine solution when titrating 4 oz.	Approximate ml. of ascorbic acid per 4 oz. of sirup
5.7	50
8.5	75
11.3	100
14.2	125
17.0	150
18.2	160
19.3	170
20.4	180
21.6	190
22.7	200

TABLE I—Data Useful in Preparing Ascorbic Acid-Sugar Syrups.

Degrees brix (percent sugar by weight)	Pounds sugar required per gallon	Pounds water required per gallon	Ounces of crystalline ascorbic acid to add per 100 gal. of sirup (68° F.) to obtain, per lb. of finished pack: When using 3 fruit plus 1 sirup			Ounces of crystalline ascorbic acid to add per 100 gal. of sirup (68° F.) to obtain, per lb. of finished pack: When using 4 fruit plus 1 sirup		
			150 mg.	175 mg.	200 mg.	150 mg.	175 mg.	200 mg.
65	7.13	3.84	24	28	31	29	34	39
60	6.44	4.29	23	27	30	29	34	38
55	5.77	4.72	22	26	30	28	33	37
50	5.13	5.12	21	25	29	27	32	37
45	4.51	5.52	21	25	28	27	32	36
35	3.36	6.24	20	24	27	26	30	34

*A more detailed description of this method may be secured by writing the Vitamin Division, Hoffmann - LaRoche, Inc., Nutley, N. J.

Give Your Truck Tires Extra Care Now

Truck tires may be even more scarce in next six months, and summer heat increases the casualties of tires, particularly synthetics. Here are practical suggestions on how to keep them rolling

COMING hot weather will make it doubly necessary to eliminate overloading, overspeeding and over- or under-inflation abuses of synthetics to keep food fleets running. "They'll be popping right and left in the hot months of July, August and September unless we give these synthetics the best of care and with the scarcity of tires, especially in the 10.00-20 size. We'll be lucky if we don't have to lay up some of our trucks before the summer is over," said one large food-fleet owner.

And that about sizes up the situation in a nutshell. For, although the war with Germany is over and the tire manufacturers have made great strides in the processing of synthetic rubber for tires and tubes, the tire building capacity and manpower is far short of present demands.

It looks as if the available quota of truck tires will be less in the next six months than in the same period of last year. Hence the need for the greatest possible conservation now.

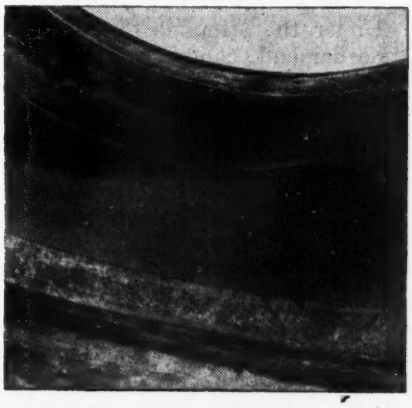
Synthetic Rubber Different

As the stock of prewar tires is exhausted, those in use will be made entirely with synthetic rubber or with a considerable percentage of it. Compared with the natural product, synthetic rubber has related but definitely different characteristics. It is a substitute material and has certain limitations in its present state of development.

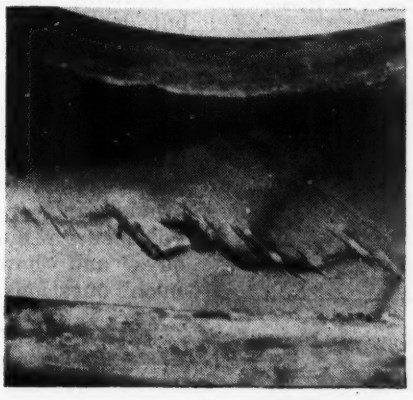
To date, synthetics in passenger car sizes have delivered mileages comparable with those made with natural rubber. In the larger truck sizes, however, the results have not been as satisfactory. This has been due to the more generally severe service to which large tires are put and the resulting heating from overloading and overspeeding. Natural rubber tires had a factor of safety to overcome such heating, but synthetics do not. So with synthetics, great care must be taken not to exceed the tire's critical operating temperature of 240 deg. F. —at the hottest place in the tire.

If the load, speed and inflation of the synthetic are maintained to keep the operating temperature at not over 230 deg., the tire should wear out before failure. But if it is allowed to reach 250 deg., the tire may blow out within a few hundred miles.

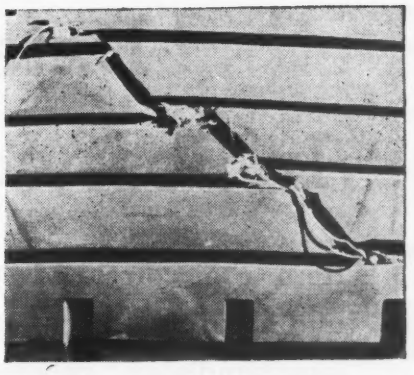
In other words, when a synthetic tire is allowed to approach its critical operating temperature of 240 deg., a slight increase in either load or speed may result in its quick failure after delivering only hundreds instead of thousands of miles of service.



Underinflation or an overload caused this tire to fail along the sidewall. Severe flexing of the sidewalls causes the cords to get too hot, lose their strength and finally break at the weakest point in the casings.



Too much air pressure used to offset overloading broke the cords at one point approximately in the center of the tread. If the air pressure had been normal under the same overload, the break would have occurred on the sidewall.



This tire was ruined by an impact with some object on the road while the vehicle was traveling at a high rate of speed. It was a quick death, too, for the break is clean, with very little of the tread blown loose.

Effect of Weather

The hot days of July, August and September have a direct bearing on the tire's critical operating temperature, because a rise in the atmospheric temperature will increase the tire temperature by the same amount. Thus while the tires on a given vehicle may make a certain run with safety on a 70-deg. day, the tires may blow out on the same run on a 90-deg. day.

J. E. Powers, Manager of the Truck Tire Department of the B. F. Goodrich Co., Akron, Ohio, in a recent address on how to get the best results from synthetic tires, laid down the following eight rules:

(1) Do not overload. (2) Do not overspeed. (3) Maintain proper inflation pressures. (4) Match dual tires. (5) Maintain proper load distribution. (6) Use correct rim size. (7) Correct misalignment of wheels, defective brakes and loose or broken springs. (8) Avoid driving over curbs or obstacles.

Synthetic innertubes and flaps also require more careful handling and mounting than those made of natural rubber. Synthetic tubes give better service when lubricated with a solution of vegetable oil soap, obtainable from tire dealers generally. The use of such a lubricant allows the synthetic tube to move properly in the tire and thus eliminate unusual stretch of the tube at any one point. The solution should be swabbed on the rim side of the tube, on both sides of the flap and on the inner portion of the tire above the bead.

Determining Factors In Postwar Food Consumption

Here are correlated with the consumption of certain foods the economic and social influences which must be evaluated in postwar planning. Strong merchandising programs are indicated for confections and beverages

By GIDEON HADARY, Washington, D. C.

PROCESSING foods to supply present-day market demands is limited largely by available labor, equipment, raw materials and packaging supplies. There is now a minimum effect in respect to income levels, age groups and family size, which reflect market consumption of foods under normal peacetime conditions, when intercommodity competition is rampant for the available consumer dollars.

But what of the postwar period? By what yardstick will food manufacturers measure the potential market for the products their wartime expanded production capacity will make potentially available? Who can or will buy their products? How much will they buy, and at what price?

An approach to some of the answers has been made with respect to candy and beverages, which might be regarded as universally marketable products. The approach was made by endeavoring to find an answer to the question: "Who buys these foods?" Is it the rich, or is it the poor? Is it the young, or is it the old?

This question had perplexed many in the food processing industry in the prewar days, but their quandary then was simple compared with that currently confronting the industry.

Candy Consumption Factors

Under the stimulus of the wartime demand, candy production in the United States has reached an all-time high. Per capita candy consumption rose from an average of 13 lb. in 1932-33 to 19 lb. in 1941, at which level it remained in 1942 and 1943. Higher consumption would obtain, no doubt, were it not for the restricted cocoa and sugar supplies.

An appraisal of postwar markets could be facilitated by a thorough knowledge of the factors affecting candy purchases under peacetime conditions. The candy industry has done an excellent job of compiling overall production and merchandising data, but less attention has been given to the candy consumer. Economic and market research can do much to provide answers to the "who buys" and "how much" questions.

In making the survey, which was conducted in South Bend and Mishawaka, Ind., in the spring of 1942, trained interviewers, under the supervision of the author, called upon a selected sample of housewives. Each housewife was asked, among other things, whether there usually was candy in the home. In addition, information was obtained as to the ages of all members of the household. The exact income of each family interviewed was secured from the records of the Credit Rating Bureau in South Bend.

A total of 564 families, or over 1 percent, of the inhabitants of South Bend and Mishawaka were interviewed in this survey. The analysis reported herewith is based on the replies of 513 families from whom income data had been obtained.

Two hundred and forty-two families, or 47.2 percent, said that they usually have candy at home; 212, or 41.3 percent, said that they usually do not; and 59, or 11.4 percent, said that they rarely have it.

The proportion of the consumers reporting that they usually had candy at home varied with family income. It was found that of the families having an annual income of less than $1,500, only 39 percent usually had candy at home. As family income increased, the proportion increased up to almost 58 percent. Table I shows the proportion of candy consumers in the different income groups.

The greatest relative change in

TABLE I—Proportion of Families Having Candy at Home: in Income Groups.

South Bend-Mishawaka, Ind., spring, 1942

Family income group Dollars	Number of families interviewed	Number having candy at home	Per cent of total families having candy at home
Up to 1,499	39	15	39.0
1,500-1,999	109	46	42.2
2,000-2,499	160	72	45.0
2,500-2,999	105	54	51.4
3,000-3,999	67	36	53.7
4,000 and over	33	19	57.6
Total	513	242	
Average			47.2

TABLE II—Proportion of Families Having Candy at Home, by "Children per Family" Groups.

South Bend-Mishawaka, Ind., spring, 1942

Children per family group	Number of families interviewed	Number having candy at home	Per cent having candy at home
None	178	71	39.9
One	151	74	49.0
Two	106	54	50.9
Three or more	78	43	55.1
Total	513	424	
Average			47.2

TABLE III—Beverages Usually Consumed During Lunch at Work: by Sex Groups.

(Chicago, summer, 1942)

Beverage	Male		Female	
	Number	Percent	Number	Per cent
Coffee	140	37.8	25	22.3
White milk	98	26.4	33	29.5
Soft drinks	77	20.7	26	23.2
Chocolate milk	19	5.1	13	11.6
All others	37	10.0	15	13.4
Total	371	100.0	112	100.0

Income and children in the family were the two most notable factors influencing the candy buying habits of the 564 families questioned in the food consumption survey, recently conducted in northern Indiana.

candy consumption was noted for the families in the $2,500 income group.

Belief is commonly held that children consume more candy than adults. This belief is borne out by the data, which indicate that there is a significant difference in candy consumption between families having one or more children and those having no children. Only 39.9 percent of the childless families usually have candy at home, compared with over 51 percent of the families with children.

Further study showed that the proportion of the high-income childless families which had candy was not much greater than the average for all childless families. However, the proportion of high-income, with-children families which consumed candy was considerably greater than the average for all families. For the low-income, with-children families, the proportion was considerably smaller than the average.

The average age of the 71 childless families usually having candy at home was 38 years, and that of the 178 families not having it was 44 years. The difference of six years, although relatively small, was found to be statistically significant. This suggests that the liking for candy is in an inverse relationship to age.

The above analyses assist in providing an answer to "Who buys candy?" Candy buyers consist largely of those of high income and of families having children. Low-income families with children undoubtedly would like to buy it, but they cannot afford to do so. Whereas the childless families, even if they can afford to buy candy, do not.

Beverage Consumption

In the summer of 1942, a beverage survey was conducted in Chicago to determine the preferences of industrial workers. A total of 483 employees provided information as to what beverage they usually consumed during lunch at work. From the replies, it was possible to divide those interviewed into five groups in accordance with the beverage said to be consumed most often. The number of people in each of the groups was expressed as a percentage of the total number of those interviewed.

From Table IV, it is seen that approximately one-third of the respondents consume coffee at lunch, another one-third usually drink milk (white and chocolate), one-fifth consume soft drinks and 10 percent usually drink other beverages during lunch at work.

The number of males and females in the five beverage groups was determined and summarized in Table III. Almost 38 percent of the males interviewed said that they usually drank coffee during lunch at work, whereas only 22 percent of the females reported that they did. Approximately equal proportions of males and females said that they drank white milk and soft drinks at lunch. However, the proportion of the women reporting that they drank chocolate milk was over twice the proportion of the males.

Those interviewed were further divided into three groups according to age to determine the relationship between age and the beverage consumed, as shown in Table V.

As the ages of the workers interviewed increased from under 24 years to 40 and over, the proportion reporting that they drink coffee increased more than threefold. However, an inverse relationship between age and the reported milk consumption was observed. Thirty-five percent of those under 24 years of age said that they drank milk at lunch, whereas only 18 percent of those 40 years of age and over said so. A less pronounced decline in consumption was reported for carbonated drinks. As the age of the employees increased, a precipitous

TABLE IV—Beverages Usually Consumed During Lunches at Work

(Chicago, summer, 1942)

Beverages	Number	Per cent
Coffee	165	34.2
White milk	131	27.1
Soft drinks	103	21.3
Chocolate milk	32	6.6
All others*	52	10.8
Total	483	100.0

*Alcoholic beverages included.

TABLE V—Beverages Usually Consumed During Lunch at Work; by Age Groups.

(Chicago, summer, 1942)

Beverage	Under 24	25 to 39	40 and over
Coffee	15.4	34.2	45.3
White milk	35.3	29.3	18.0
Soft drinks	28.9	20.7	20.4
Chocolate milk	16.0	4.7	1.7
All others	4.4	11.1	14.5
Total	100.0	100.0	100.0

decline in the proportion saying that they drank chocolate milk was observed; 16 percent of those under 24 years of age said that they drank it at work, during lunch, whereas only 1.7 percent of those over 40 years of age did so. As in the case of candy, this decrease in chocolate-flavored milk consumption is attributed to the fact that the liking of sweet foods is greater among young people.

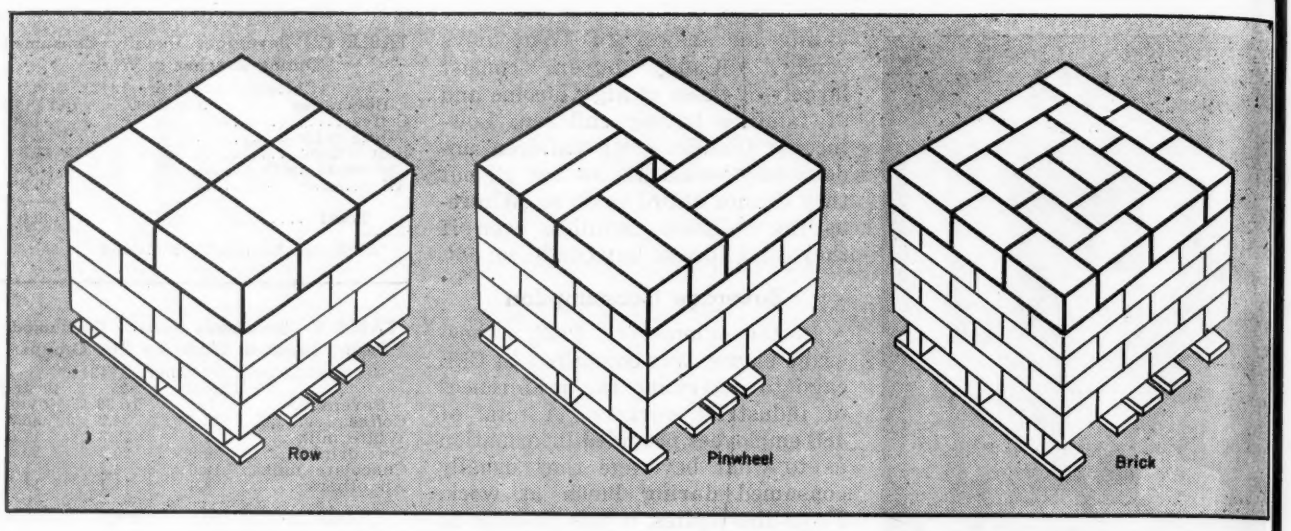
Postwar Consumption

A decided change in the age composition of the population has been taking place in this country. Birth rates have been consistently declining, resulting in the gradual increase in the average age of the population. Such a change in the age composition will have an important effect on the sales of candy, carbonated beverages, milk, and kindred foods because an ever-decreasing proportion of the population will be in the age group where highest consumption of these foods is observed. In contrast, an ever-increasing proportion of the population will be in the age group where highest coffee consumption is observed.

This shift in the age composition of the population is a long-time trend, and its effect on the demand for candy, beverages and kindred foods is not likely to be noticed appreciably for several decades to come. In contrast to this long-time trend, the very high birth rate of the present war period will tend to increase the intensity of the demand for candy, carbonated beverages and milk for several years to come.

It has been shown, in the first part of this report, that the propor-

(*Turn to page* 204)



Some typical pallet loading patterns. Row arrangement is undesirable. The pinwheel and brick types are satisfactory, depending on the shape of the container.

Glued Pallet Loads Reduce Costs, Protect Cartons

Now extensively used in shipment of Army and Navy supplies and by large grocery companies for intra- and inter-plant handling. Adhesive is applied to cartons as they are stacked on pallet. Packages are loosened by a blow of the hand

CURRENT programs of the Army and Navy are focusing attention on adhesive palletizing, particularly for subsistence items. The importance of this technic to shippers is attested by the fact that the Army already has issued specifications* covering its use, and the Navy has instituted a plan to palletize at the dock all shipments not so prepared by the manufacturer. Its convenience is indicated by its adoption by several large grocery concerns for intra- and inter-plant handling.

This procedure retains the convenience and labor saving achieved by handling shipments in palletized units, while substituting a non-critical material for the steel strapping customarily used. There also is an important reduction in raw material cost (on the order of $23 per car) and added protection to the materials in transit.

Steel strapped loads on pallets can be handled on and off freight cars and ships, but under the shocks unavoidable in wartime transit there is a tendency for the cartons to shift, even when six steel straps are used, three in each direction.

Analysis of the forces encountered by the pallet load indicates that what is needed is a material that prevents slipping of the containers one on another but permits one to be lifted off its neighbors. Fortunately, among the vegetable glues are some that are strong in shear and weak under tensile stress. These can be so formulated that they do not penetrate deeply into the fiberboard and the containers remain in condition for further distribution or storage.

These adhesives were tested and adopted to supplement steel strapping, using three steel straps in one direction and trusting to the adhesive to replace the other three. Experience has since demonstrated the feasibility of dispensing with all steel strapping on the load. Sleeves on fiberboard containers and the individual wood boxes are still strapped.

A pallet load so bound not only

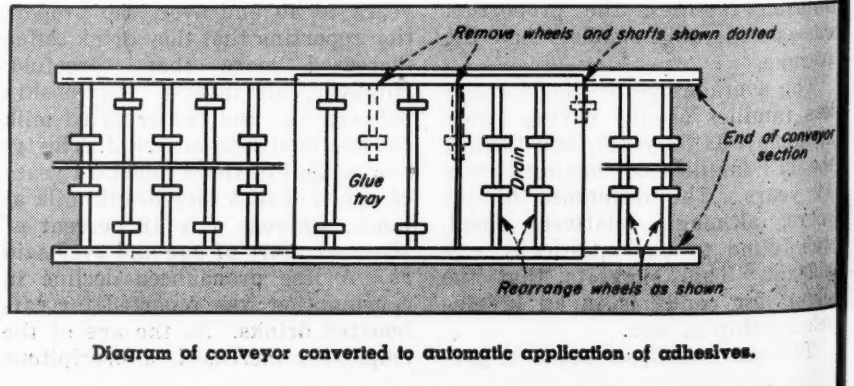
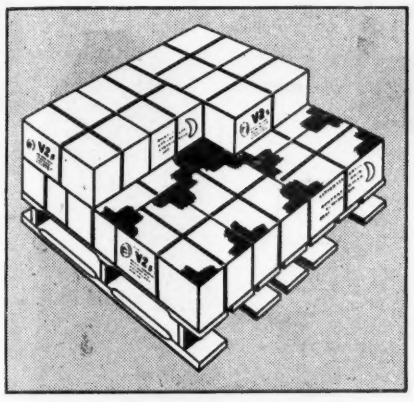


Diagram of conveyor converted to automatic application of adhesives.

*OQMC Tentative Spec. No. 203, April 9, 1945

will remain together under shipping stresses, but, because the containers remain aligned, they afford extra protection. Since the average load on a standard 48x48-in. Navy pallet is about a ton, a fall of even a few inches represents a terrific shock. Pallet loads "unitized" with adhesive have withstood drop tests of as much as 30 in. and have stood up as full-floating loads in cars subjected to humping at 10 miles per hour, which is far over any normal transit hazard.



Pallet and fiberboard shipping containers showing how glue is applied with a brush.

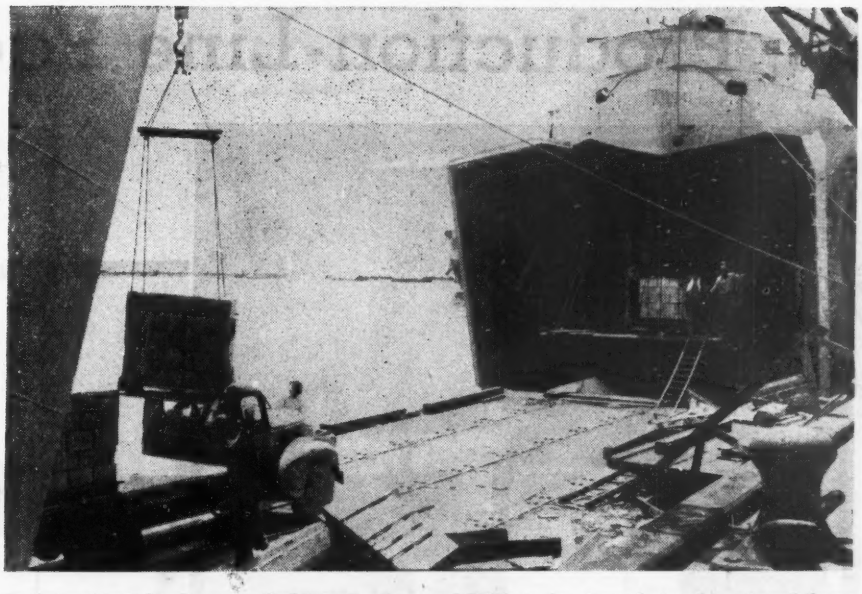
When it is desired to break down the load for use or redistribution, a sharp upward blow with the hand will loosen each container, so that it may be lifted off.

Methods of Gluing

Glue palletizing is possible in any shipping room. For fiberboard containers the adhesive is applied directly, for wooden containers adhesive-treated chipboard strips are used.

Where fork trucks are available, the manufacturer may palletize at the end of the packaging line. When the adhesive is applied by hand a band is brushed around the edge of the pallet and the first layer of cartons is set in place. L-shaped applications of adhesive are made on top at each corner of each box, and the second layer is put in place. Any of the interlocking patterns may be used in forming the load. Stacking of one carton on top of the other in the same relative position must be avoided. Pallets may be stacked two-high in freight cars as full-floating loads. Since the adhesive sets within five minutes, it is possible to handle the loads as soon as they are assembled.

If the fork truck is not available, the pallets are put in place in the freight car and the load is built up in the same way there.



Palletized unit loads are rolled into the bows of LST's to be stowed six abreast and three high in the long, flat tank deck.

Automatic application of adhesive at the end of the sealing conveyor line has been developed by cooperation of Navy personnel, the National Adhesives Division of National Starch Products, Inc., and P. Ballentine and Sons. This method, used in Ballentine's Newark plant for beer, has now been adopted by the Navy for all incoming loose loads at the loading dock at Bayonne, N. J., and the Naval Stores Depot at Seattle, Wash.

A shallow galvanized iron glue pan, with a drainage compartment, is installed under a section of a wheel conveyor. Gluing rollers replace the conveyor wheels over the glue compartment, in such a way as to apply two bands of glue the entire width of each box. Roller skates turned upside down were found entirely satisfactory for this purpose. Re-arrangement of the conveyor wheels above the drainage section prevents contact of the adhesive with the mechanism. It is not necessary to apply glue to the pallet, that on the bottom of the boxes in the lowest layer being sufficient. Boxes are removed by hand at the end of the conveyor and stacked directly on the pallets. At Bayonne all boxes travel over a gluing conveyor as they are handled into the cars.

For wooden boxes, chipboard strips are passed through a glue bath, then applied in an *X* pattern, from the corners toward the center, not quite meeting. These strips are used both on the pallet and on the top of each box. They provide some cushioning action as well as holding the load together.

A vegetable-base aqueous-type adhesive free from organic solvents is specified. Organic solvents cause penetration into the fiberboard, even with an asphalt barrier. Adhesives of the sodium silicate type hold too firmly and do not allow separation of the load without damage to the cartons. Other possible adhesives contain critical materials, or are too expensive.

The Navy program is now in force for beer and canned milk. The Army specification may soon be made mandatory for 10-in-1 and C-Rations.

Extension to all subsistence items is contemplated, but a word of caution is necessary here. No shipper should use glue-bound loading unless specific arrangements have been made with the receiving depot or purchasing authority. Premature adoption of the method may lead to difficulties at the receiving bases.

Future Possibilities

That is the present status. There are further possibilities. For all but the very heavy loads, it may be possible to use fiberboard trays instead of wooden pallets, avoiding the difficulties of pallet returns. It is even probable that for certain uses loads may be handled without pallets.

There are limitations. Sleeves can be glued on the containers, but there seems to be no way to prevent destruction of the glued sleeves at the receiving end. Also shell egg containers, and probably other boxes which must be held in cold storage should not be treated in this way.

Production-Line Packaging

1. Items which must be protected from moisture are placed in cartons of double kraft-lined bending board laminated with a water-resistant adhesive. The inner chipboard liner is die cut to insure snug fit. Box former almost doubled box production.

2. While metal fingers hold the inner wrapping in place, a sleeve is slipped over the box. The end flaps of the sleeve are held closed by tape. All flaps of the slotted carton must meet, with no overlap and no gap of over 1/16 in. when glued.

3. Components are put in place as the boxes go by on a belt. Arrangement of the items permits filling without any pause of the conveyor.

4. With flaps tightly held by waterproof adhesive applied over almost the entire flap area, and both horizontal and vertical score lines in register, the machine-sealed cartons are completely submerged in 2 wax dips. The wax must not melt below 140 deg. F. nor chip down to 20 deg.

Assembly-line filling of the Quartermaster Corps 10-in-1 Ration packages at the San Antonio Army Service Forces Depot illustrates the possibilities of efficiency in the use of labor on hand-packing operations. Conveyor lines on two floors insure speed and accuracy from the formation of the box to the final shipment

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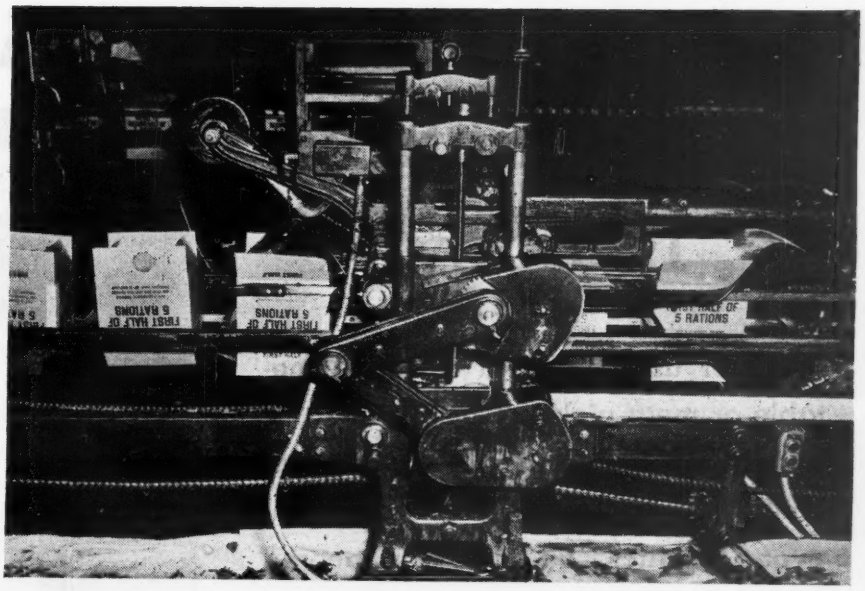
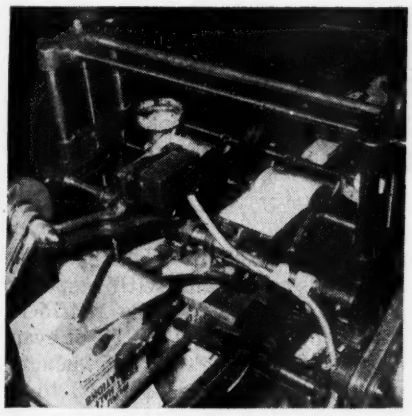
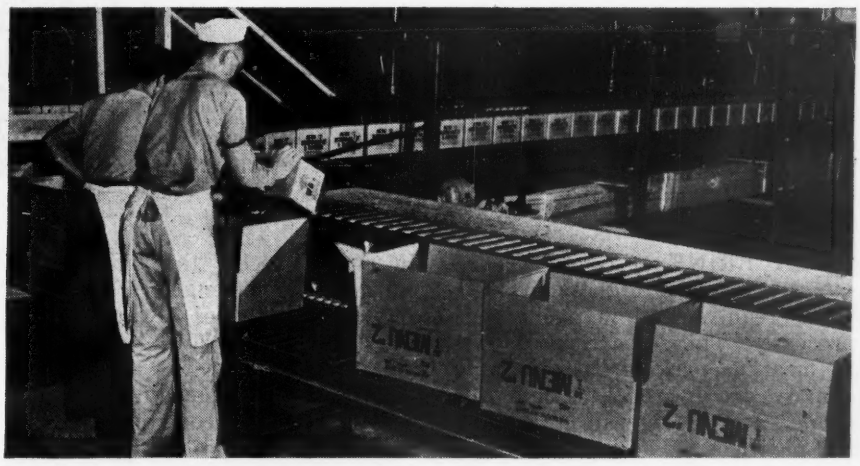
Photos by U. S. Army Signal Corps



5. The wax dipped cartons are sealed in a snug-fitting regular slotted container made from B flute double-faced corrugated board.



6. Dinner units other than canned items, cereal, sugar, soluble coffee, salt, biscuits, Halazone tablets, cigarettes, matches and toilet paper constitute the "first-half" of the ration. Each box holds enough of these items for 5 men for 1 day (closeup of 5).



7. Two of the first-half cartons, with two solid fiberboard containers holding the cans, soap and towels, are assembled in a master carton, which is then sealed and fitted with a sleeve. The sealed boxes containing the first and the second halves of the ration are brought to the assembly point on separate conveyor lines.

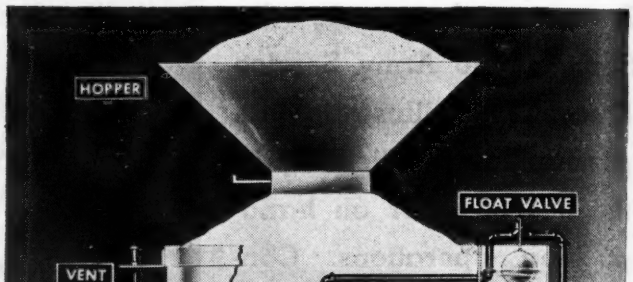
8. The final step in assembling the ration is binding the outer sleeve with wires in two places, before making up the pallet units for shipment.

9. Enough rations to feed 700,000 men for 1 day are sent off the assembly lines at this depot each week. Containers may go direct to cars or to the storage.

IF BRINE IS SATURATED
Salt Control Is Easy

Whether used in meat curing, vegetable or meat pickling, fruit brining or quality grading, brines of uniform salt content are an aid to positive control over product quality. Engineered brine-making systems — large and small—are described by the author

By D. W. KAUFMANN
International Salt Co., Inc., Scranton, Pa.



Basic features of an engineered system for making a uniform saturated brine.

SALT BRINE of controlled strength and high purity is a basic requirement in many food processes. This is particularly true in meating packing, fish canning, gravity grading of peas and lima beans, and refrigeration systems, to mention a few applications. Brine that is too weak means spoilage or imperfect grading. A too strong brine results in too salty a flavor, inhibition of the fermentation action necessary to produce tart flavors, and withdrawal of juices.

Many modern vegetable, fish and meat processors have turned to a simple, economical way of obtaining brine of any predetermined strength. The method makes possible savings as great as 25 percent in labor and salt costs because it wastes no salt and is quick and easy to use. With an engineered rock salt dissolver, processors obtain a saturated brine of high purity that can be diluted easily and accurately to meet specific requirements.

In some processes, it may be argued that there is permissible leeway in brine strength—that it does not have to be precisely accurate. Such arguments cannot hold, however, because there are factors in every process that change the initial brine strength. For example, process brines always are diluted by withdrawn water and juices.

Granting that some of these factors cannot be controlled, discretion urges regulation of those that are controllable. Otherwise, borderline cases may result in a bad product instead of a good one.

Three Ways—Two Wrong

Food plants that use salt have a choice of three ways of measuring it: (1) By dry salt volume (dry volumetric), (2) by dry salt weight (dry gravimetric), and (3) by saturated brine volume (solution volumetric). Of the three, measurement by saturated brine volume gives the greatest accuracy.

Imperfect as the dry salt volumetric measure is, it is by far the most common method. Its application varies from such measurements as "9½ shovelfuls" to the use of a pail or other container of supposedly definite volume which is scooped through the salt pile or filled by shovel.

Even when such a container is measured or calibrated carefully, the volume of salt in it varies to a surprising degree. A completely solid 1 cu. ft. lump of salt, without any voids at all and with a specific gravity of 2.163, weighs 134.75 lb. On the other hand, 1 cu. ft. of evaporated salt made by the vacuum-pan method weighs from 63 to 89 lb., depending upon the grain size and the degree of compaction. A cubic foot of evaporated salt made by the open-pan method ("grainer" salt) varies from 35 to 76 lb. for the same reasons. In every case, these weights are for dry salt and are independent of increases caused by moisture absorption.

This wide range in weight means that the voids or unfilled spaces in the various kinds of salt will vary from 37.5 to 74 percent by volume. Obviously, these voids can be filled to almost any desired extent by the addition of fine or degraded particles of salt. They can also be filled by packing of the lower layers in storage, caused by the weight of overlying salt, by alternate wetting and drying, or by vibration and jarring of storage floors.

Incidentally, the effect of the jarring can be very pronounced, with the difference in the weights of 1 cu. ft. of loose evaporated salt and 1 cu. ft. of compact evaporated salt ranging from 10 to 20 lb. To cite an actual example: A certain type

of fine salt weighs 66 lb. per cubic foot loose, 77 lb. packed and 84 lb. heavy-packed. If absorbed moisture further aids the compaction, the weight (dried) is 92 lb. per cubic foot.

In addition to the variables arising from the physical condition of the salt itself, there is a further factor introduced by scooping the measuring container into a salt storage pile at varying depths and speeds. Then there is the fluffing effect that occurs when shoveling salt into a large container.

Other Possible Errors

Potential additional errors are likely because of imperfections in the measuring container itself. Invariably made of thin metal, the container becomes dented and battered, which changes its volume. Furthermore, salt cakes firmly on the bottom and sides of measuring containers. When this cake is not removed, the volume of the container is altered still more.

While gravimetric measurement of dry salt on reasonably accurate scales is not subject to as much error as dry volumetric measurement, it still is far from satisfactory. Even though the plant scales are accurate, the variable moisture content of the salt defies every attempt at accuracy.

Depending upon humidity, length of storage and varying bulk and area of the stock pile, kiln-dried salt at the user's plant may contain from 0.05 percent to as much as 5 percent moisture under very humid weather conditions. Notable changes sometimes occur in less than 48 hours.

Air-dried salt will vary even more in weight. Under unfavorable storage and weather conditions, some salts will deliquesce readily enough to form pools of brine underneath. Obviously it is difficult, if not impossible, to weigh accurately a commodity that changes so quickly and radically in weight. For that reason, dry gravimetric measurement is, at times, as inaccurate as dry volumetric measurement.

Brine Is the Answer

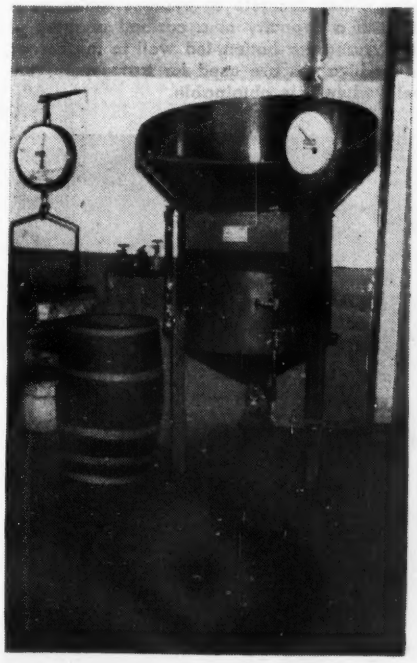
The problem can be solved by measuring the salt volumetrically in the form of saturated brine. The brine, however, must be fully saturated, regardless of the temperature of the solvent water. Therefore, successful use of this method calls for an engineered system that will produce, infallibly and automatically, a crystal clear brine, free of suspended undissolved solids. Such systems range in brine capacity from a small self-contained unit to one requiring a carload of salt for a charge.

Small Systems

For small or medium plants, a mechanical unit known as the Lixate Rock Salt dissolver is employed. It consists of a tank with float control and a brine collecting chamber. It combines a method of dissolving rock salt without agitation and a method of self-filtration. Both operations take place within the unit itself. Water enters through a nozzle at the top and percolates down through the rock salt. As the salt dissolves, it is replaced automatically from a hopper on top of the unit. Solution action is greatest near the top and ceases about 1 ft. from the bottom of the cylindrical part of the tank, at which point the water has become fully saturated. The lower part of the salt bed remains as a filter through which the saturated brine must pass to reach the brine collecting chamber and to the storage tank.

Large Systems

For large plants, the system consists of one or more large rectangular concrete or wooden tanks or circular wood silos. These employ the same principle of dissolution and filtration but have a salt storage capacity of as much as a carload.



For small or medium-size plants the system may consist of a single self-contained unit, having a salt capacity of about 3,000 lb. This unit is in a fish packing plant using a range of brine strengths. An oak barrel serves as receiver for saturated brine to be used as is or diluted as wanted.

Brine made in this manner almost invariably is measured by the change in level in a storage tank, by filling an empty tank to a certain mark, or by a brine meter. Regardless of tank size or depth, it is easy to read a liquid level within 1/32 in. by contact-point instruments, meniscus reading devices or simple mechanical means. When the brine level in a vertical tank is changed as little as 1 ft., either by adding brine to the tank or drawing it from the tank, reading the level to within 1/32 in. gives accuracy of 99¾ percent. If the change in depth is greater than 1 ft., accuracy is increased proportionately.

When a large number of individual measurements of brine volumes must be made, brine meters are used. These are accurate on flows within reasonable range of the manufacturer's rating.

Temperature Cancels Out

Although brine made as described is always fully saturated, the question of possible error due to variation in salt solubility with temperature frequently is raised. The answer to that is simple. One gallon of saturated brine at 60 deg. F. holds 2.647 lb. of salt. If it is heated, it will hold slightly more salt. However, under these conditions, the brine itself expands to greater volume. At the higher temperature, slightly more than 1 gal. of brine contains slightly more than 2.647 lb. of salt. If exactly 1 gal. of this warm, expanded brine is tested, its salt content will be practically the same as before. We then have the interesting fact that regardless of the solvent water temperature, in the range commonly found in plants, 1 gal. of brine taken from the rock-salt-dissolving unit may be considered as having a salt content of 2.647 lb.

In many plants, of course, brine is used at some predetermined strength instead of at full saturation. In this case, it is an exasperating, time-consuming and wasteful procedure to shovel salt into a tank, stir it until dissolved, and then alternately add salt or water until repeated tests with a salometer show the brine strength to be approximately correct. Use of almost-saturated brine in place of dry salt is almost equally inconvenient. Furthermore, the final volume of finished brine is never precisely correct, but over or under the desired quantity.

Dilution Avoided

The use of a saturated brine avoids all of these dilution problems. Water may be run into an empty tank to a certain mark, and the saturated brine added to bring the volume up to another mark. The mixture of water and saturated brine will give the exact strength of the dilute brine required, as well as the exact volume. If a tank, only partly emptied, is to be refilled with some definite strength of dilute brine, a Lixate Dilution Paddle or a Lixate Dilution Diagram painted on one of the inside walls of the tank permits approximately the same procedure as for an empty tank.

Where It Pays Off

In any food process, failure to attain a "just right" brine strength is likely to mean waste of salt, waste of manpower, waste of time, development of spoilage, production of an inferior product or various combinations of these undesirable results.

In meat curing by sweet pickle, for example, the curing formula calls for definite quantities of salt, sugar and sodium nitrate and/or sodium nitrite. Too little salt means spoilage; too much, an oversalty flavor. In artery pumping of pickle, a given volume of pickle is forced into each ham, the quantity depending upon the ham weight. The salt content of the pumped pickle must be particularly accurate. Otherwise, either spoilage or poor flavor results. Considering the care and effort exercised by meat packers to obtain fine flavor, it is obvious that accurate salt measurement is especially important to the meat packer.

Guarding Against Shrinkage

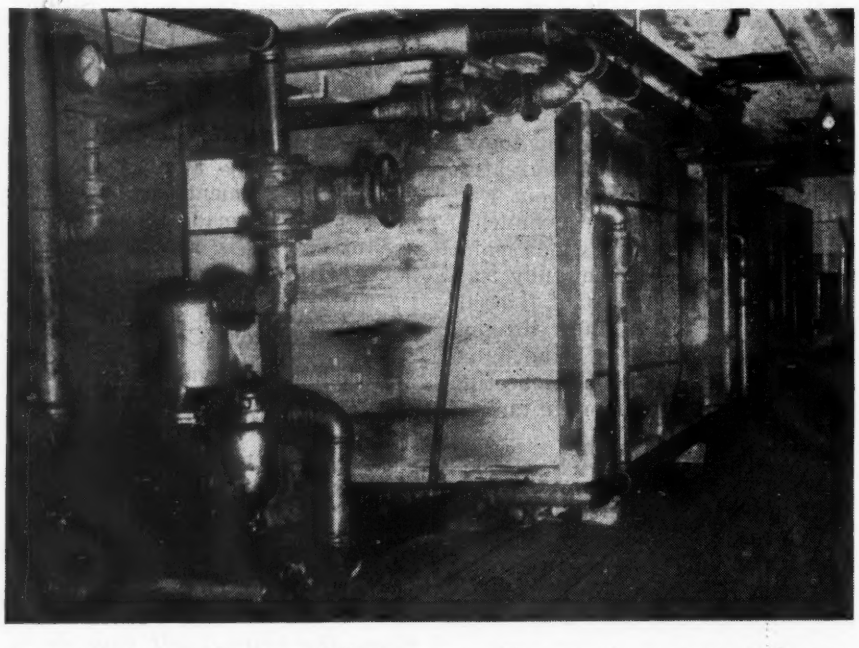
The chill rooms in meat plants must be cooled by spray decks, wall cabinets or unit coolers. Keeping the spray brine clean and at definite strength are troublesome problems, both of which are solved by the engineered rock salt dissolving unit. A slight increase in brine strength causes excessive meat shrinkage, and extra shrink even of the smallest fraction of a percent means a sizable profit loss for the packer. Furthermore, excessive brine strength causes increased waste of salt in the overflow.

In cucumber pickling, a too weak brine causes spoilage, while a too strong brine inhibits fermentation and injures both the appearance and the flavor of the pickle.

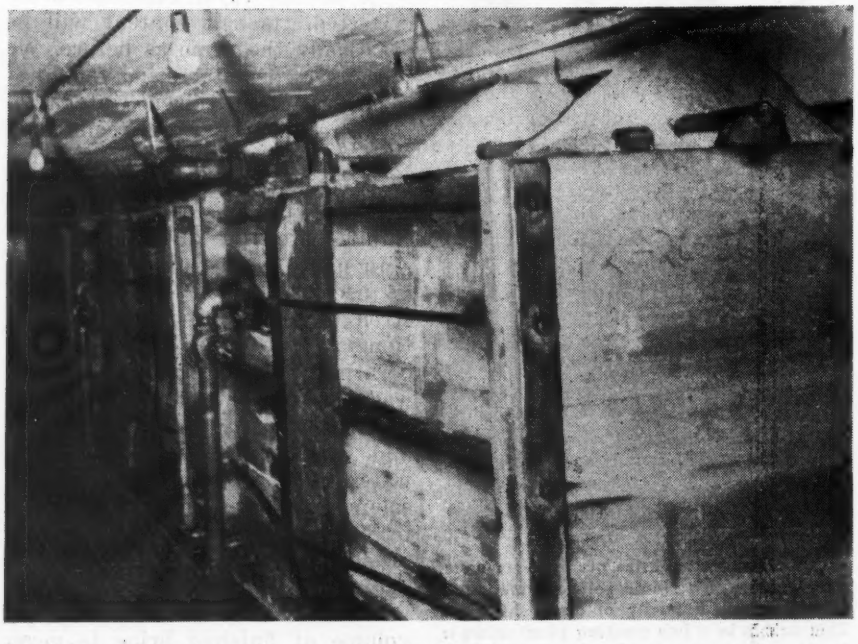
In gravity grading of peas and lima beans, the grading brine must be of definite strength and reasonably free from skins and broken fragments. Any failure to control brine strength accurately results in faulty grading and financial loss through frequent degrading. By keeping the brine clear of suspended matter, which would give it an abnormal specific gravity, the dissolving unit aids in holding the brine at correct strength.

In the sardine industry, the fish are immersed in brine of definite strength for a certain time, so that they absorb the desired amount of salt. Low brine strength means spoilage; high strength causes excessive withdrawal of fish juices and oils, injuring both flavor and nutritional value.

It is apparent, therefore, that in any food process in which brine is used an engineered salt dissolving unit will help to safeguard product quality.



For six of its plants Armour and Company uses either concrete or cypress tanks as a combined storage, dissolving and filtering unit with a capacity of a carload or more of salt. Saturated brine is pumped as needed from a triangular bottom-fed well in the corner of each dissolving tank. In the main, iron pipe and valves are used for transferring the brine. The horizontal headers are stainless steel—when it is obtainable.



Dissolving and filtering tanks are constantly filled from overhead salt storage of carload capacity. Salt-dissolving water is sprayed in near the top of the tanks and the brine is drawn out through the bottom-fed wells in corner of the tanks.

SHORTCUTS In Plant Operations

Jar Cleaning Speeded

Home-made jar twister, used in pairs, solves the glass packer's problem of cleaning containers before filling them.

HERE is one solution to the glass packer's problem of cleaning and drying jars, at production-line speed, before filling them. It is a pair of jar twisters, or inverters, devised by Cooperative G. L. F. Farm Products, Inc., Bloomsburg, Pa. One turns the containers upside down for washing and drying, and the other turns them right side up again for filling.

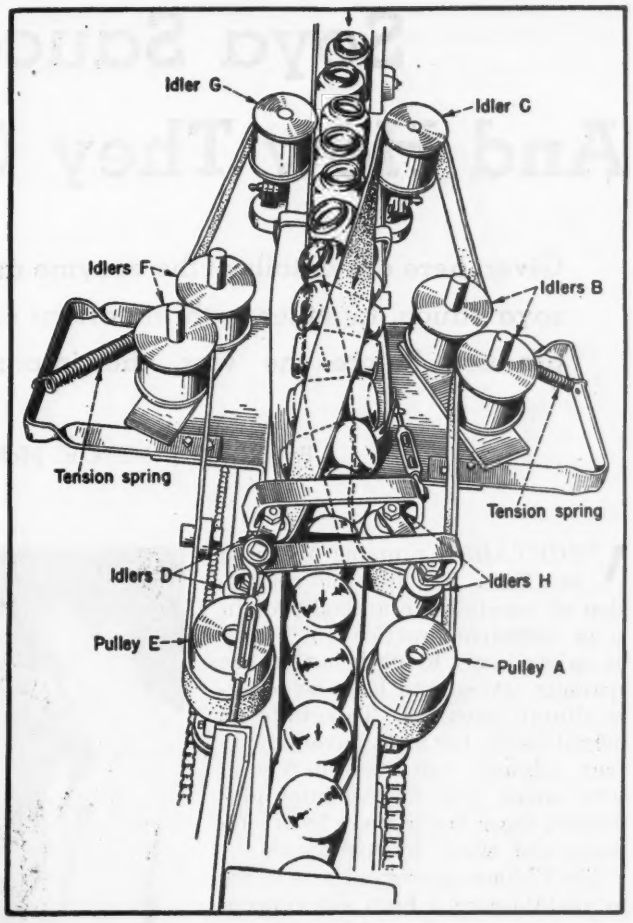
The glass jars are delivered to the first twister right side up on a link chain belt. They are then carried through the independently driven twister by the twisting belt and onto a flat slotted belt. Beneath this slotted belt is a 2-ft. pipe with 5/16-in. holes drilled in the top. It is connected to the hot-water line, and as the jars pass over it a spray of hot water is shot into them. Ordinary city water pressure is used, and no detergents are necessary. The belt then travels over a pipe which shoots steam into the jars at a pressure of about 110 lb. The hot water wash and the steam rinse require about a 10-ft. conveyor.

Following this treatment, the jars continue to travel on the slotted conveyor for approximately 30 ft., this distance being covered in about half a minute. The jars now enter the second twister, where they are turned right side up and are ready to be delivered to the filler.

Each twister is driven independently by a motor and speed reducer and synchronized with the jar conveyor.

Construction of the twister is relatively simple. The device consists of a continuous belt, pulleys and idlers, as shown in the drawing. The belt travels from pulley *A* to idlers *B*, to idler *C* and then to idlers *D*. The section of the belt between idlers *C* and *D* gives the jars the first twist. The belt then travels to pulley *E*, and from there returns to idlers *F* and *G*, thence to idlers *H*. The portion of the belt between idlers *G* and *H* gives the jars the final twist, and the containers are delivered to the conveyor belt in an inverted position. The belt returns to its original position at pulley *A*.

While the glass jars are being twisted, they should travel through a stainless steel trough which serves as a guide. The springs on idlers *B* and *F* must be very strong to keep a tight tension on the belt. When the twister is running empty, the idlers should be taut enough to keep the bottom and top parts of belt fairly snug. To prevent chipping the tops of the jars, it is important that the containers, after being inverted, be carried on belting conveyors rather than chain conveyors. When the jars are carried right side up, however, a chain conveyor is satisfactory. The belt which turns the jars is 2 in. wide and of heavy canvas composition.



Drawing of home-made jar twister.

Safety Through Color

Parts with which workers should not come in contact are painted a distinctive color, as are valves on fluid food lines.

PAINT in different colors is used by P. J. Ritter Co., Bridgeton, N. J., to prevent accidents to employees working on machines. And the same technic is effective in protecting equipment against the carelessness of the people operating it. Parts of moving equipment which the hand should touch are painted one color. Dangerous parts with which the workers should not come in contact are painted another color. As protection to the product being handled, valves on fluid food lines are painted a color which designates them from other valves.

This safety-through-color technic is even applied to packaging machines in the Ritter plant. The moving and more dangerous parts are painted a light color and parts that the hand is supposed to touch are in a dark color.

Soya Sauce Processes And How They Can Be Improved

Given here are details of the enzyme and acid hydrolysis methods of making soya sauce, together with important suggestions for raising the quality of the product. Before the war, the imported sauce outsold the domestic 2 to 1

By LEWIS J. MINOR, McKay Davis Co., Toledo, Ohio

VEGETABLE proteins are used in China because the conversion of vegetable to animal protein is an inefficient practice which may be enjoyed only by nations that are sparsely settled and have large agricultural resources. To satiate an inbred desire for meat flavors, however, Chinese scientists developed soya sauce and monosodium glutamate, these being made from soybeans and wheat by hydrolysis.

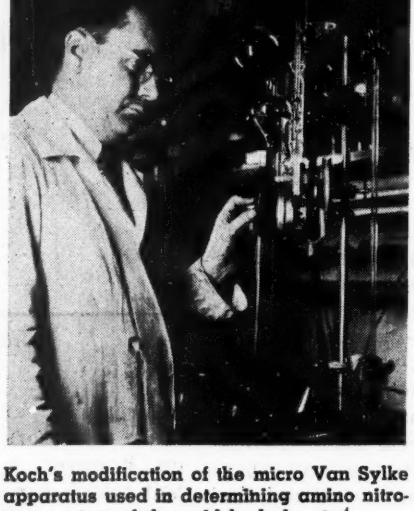
The Chinese preserved soya sauce by maintaining a high salt concentration ranging from 18 to 24 percent, and then "Sho-yu," as it is called by the Chinese, replaced the inevitable salt shaker on Chinese tables.

Present Status in U. S.

In recent years, both soya sauce and Worcestershire sauce have been introduced throughout the United States, where they have rapidly become important condiments. All of the Worcestershire sauces contain soya sauce, the better Worcestershires have as much as 30 and the cheaper ones only 10 or 15 percent.

At present there are only two or three manufacturers of genuine soya sauce in the United States, and these firms use the approved Chinese method, with important technical modifications which permit ripening the sauce more evenly and quickly than by ancient practices.

Before the war, American soya sauce manufacturers probably were producing less than 1,000,000 gal. of soya sauce per year. Chinese restaurants were using possibly an additional 2,000,000 gal. which was imported from China. This imported sauce sold competitively with the domestic product, despite import tariff taxes. Here then is a challenge.



Koch's modification of the micro Van Sylke apparatus used in determining amino nitrogen content of the acid hydrolysate.

Composition

Soya sauce consists of a mixture of amino acids, peptides, polypeptides, peptones, simple proteins, purines, carbohydrates and other lesser organic compounds suspended in an 18 percent salt solution. Total solids constitute about 25 percent of the unadulterated product, which has a moisture content of approximately 75 percent. Soya sauce possesses a distinctive odor which develops during the manufacturing process, and for which at least one investigator claims to have identified the organic compounds responsible.[1]

Methods of Manufacture

There are two methods by which soya sauce is commonly manufactured. One is the ancient Chinese method of proteolytic enzyme digestion, the enzymes being activated through mold cultures. Specific types of molds are chosen, including *Aspergillus flavus, Aspergillus niger* and *Aspergillus oryzae*, each mold imparting a distinctive flavor and character to the finished sauce. Dyson[2] has given a detailed description of one procedure which requires two years for the production of a quality sauce. Two firms in this country, however, are producing a comparable product in six to eight weeks through modernization of the ancient process.

The second method consists of the acid hydrolysis of certain protein-bearing grains. Constant-boiling hydrochloric acid is generally used, in the proportion of three to five parts of acid to one part protein. Hydrolysis is carried out by refluxing the mixture until a maximum concentration of the resulting amino acids is obtained.

In both methods, the starting material, containing the necessary proteins, consists mainly of soybeans and wheat.

Using the mold enzyme method, Illini (variety) soybeans are soaked overnight at 75 deg. F. The beans should be covered completely with water, the water should be changed two or three times, and aeration should be provided to avoid lowering of the pH and subsequently souring the beans. The remaining hard beans are softened by steam-cooking the mass on wire trays (for two to four hours at 250 deg. F.) in an autoclave. The beans are then allowed to drain and partially dry within the autoclave for four to six hours.

Two parts of precooked beans are then mixed with one and one-half parts of crushed roasted wheat, which provides aeration and prevents overheating during proteolysis. The wheat is roasted to a nut-brown color in a standard coffee roaster and cracked in a coffee mill

set for a coarse grind. Now the entire mass is inoculated with a mold culture such as *Aspergillus oryzae*, which may be propagated in the laboratory on malt, wort, agar or semi-softened rice. This inoculated mixture of beans and wheat (moisture content, 25 to 30 percent) is allowed to stand for three days in a closed box where the mold develops rapidly at 100 deg. F. and 100 percent relative humidity. This box resembles an experimental dehydrater, having screen trays spaced 4 in. apart. During this period, the bean-wheat-mold mixture must be turned and broken up at least twice daily. It is important that uniform layers no thicker than 2 in. be maintained, and that the temperature and humidity of the box be kept uniform.

When the mold has developed sufficiently, a heavy white mycelium will have formed throughout the mixture. There should be no sporulation in evidence (green-yellow). Then the entire mass is placed in a 20-deg.-Baumé salt solution and allowed to react in sterilized glass vessels (at this salt concentration, side reactions are avoided). The mold grain mixture is placed loosely in the vessel and is agitated only enough to eliminate large open spaces. It is customary to add the salt solution until it just covers the mold-grain mixture.

Fermentation is allowed to proceed for six to eight weeks at 120 deg. F. Meanwhile, the Baumé must be checked frequently and maintained at 22 deg. Once daily the mass is turned to insure uniform ripening. After six to eight weeks, the sauce is pressed out of the grain mass, filtered and pasteurized. Filtration may be achieved by applying vacuum or pressure through a filter cloth or paper. Pasteurization is achieved by heating quickly to boiling, then cooling to room temperature. Following pasteurization, it is advisable to refilter since some coagulation of solids will occur at the boiling temperature.

After the sauce has been pasteurized and filtered, it is ready for bottling. Soya sauce should be filled cold to avoid excessive corrosion of the filler and to prevent vacuum effects from causing moisture-vapor contamination by infiltration of air upon cooling.

Costs and Equipment

The initial cost would be about $25,000 for a plant designed to produce 50,000 gal. of sauce annually by the mold-enzyme method. This estimated cost includes a frame building. In normal times, sauce made by this method would cost the manufacturers approximately 25 cents per gallon to produce. It would then sell for about 50 cents a gallon.

The commercial equipment required to produce soya sauce by the mold-enzyme method includes the following:

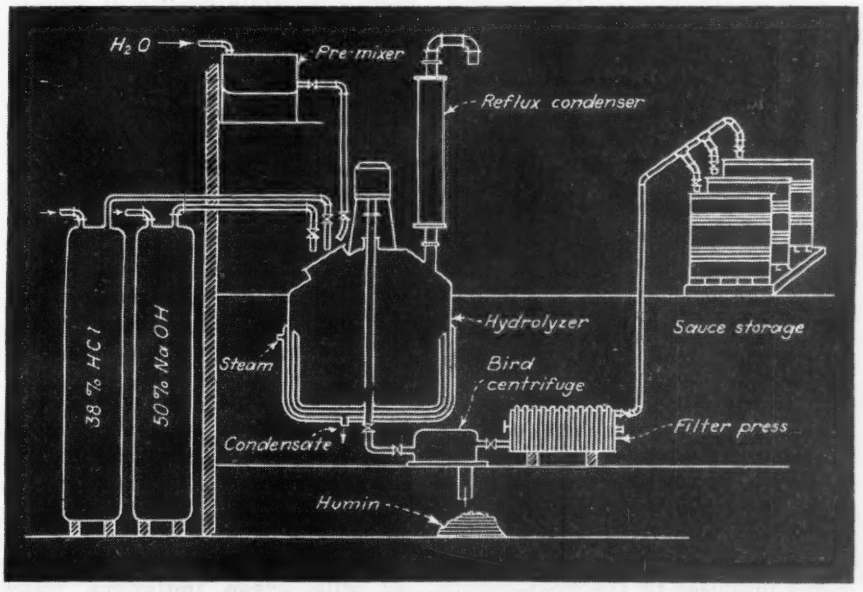
1. An incubator for producing molds for inoculation.
2. An autoclave for sterilizing mold-growth flasks and bottles.
3. Soaking tank for the beans (may be wooden).
4. Wheat roaster (standard coffee roaster).
5. A grinder for crushing the wheat.
6. Autoclaves to prepare the beans for inoculation (canning retorts).
7. An air conditioned room for mold development in the bean-wheat mass. This room should be designed to permit the proportioning of clean humidified air throughout the space. Accurate temperture control likewise should be provided for the room. Since heat is developed in the process, it seldom has to be supplied to the room. In the Orient, it is customary to build these rooms with thick walls as insulation against outside temperatures. Adequate stainless steel trays should be provided. Openings are provided in the ceiling to vent carbon dioxide and damp air. Steam pipes near the floor make it possible to heat the room in cold weather. Manufacture is often suspended in the summer months except when ice or other refrigeration is available.
8. A room is required for the proteolysis reaction which occurs in the 22-deg.-Bé. salt solution. This room requires heating equipment to maintain 120 deg. F.
9. A filter press for separating the sauce from the grain cake and filtering the finished product.
10. A pasteurizing kettle.
11. Aging tanks (wooden).
12. Filling equipment.

Acid Method

Digestion—As has been stated before, in the acid method of soya sauce manufacture, a mixture of soybean and wheat proteins is hydrolyzed with constant boiling hydrochloric acid (20 percent solution of hydrogen chloride gas in water), until a maximum concentration of amino acid nitrogen has been obtained, as estimated by the amino-nitrogen apparatus of Van Slyke.[3,4] The ratio of bean to wheat protein is identical to that used in the mold-enzyme method.

Ordinarily, one part of the protein mixture is hydrolyzed with three to five parts of 20 percent hydrochloric acid solution (muriatic acid). This reaction may be carried on in a steam-jacketed glass-lined kettle equipped with either a tantalum or carborundum condenser. To start the reaction, a premix of the protein mixture with water is made in a dough mixer. Water is added until a pasty consistency has been achieved, the mass is transferred to the glass-lined hydrolyzer, and 21-deg.-Bé. concentrated HCl is added to the mass in the correct proportion to make 20 percent (constant boiling) hydrochloric acid. Heat is applied until the acid boils, and hydrolysis then proceeds rapidly. A suitable end-point is reached after 12 to 16 hours.

Finishing—After the reaction



Flow sheet of acid hydrolysis process for soya sauce manufacture.

end-point has been reached (as determined by frequent Van Slyke amino-nitrogen estimations of samples selected in the progress of hydrolysis), the batch is neutralized gradually with a 50 percent solution of sodium hydroxide. Experience indicates that 4 to 6 milligrams of amino-nitrogen per cubic centimeter of hydrolysate can be expected when soybean meal and roasted spring wheat are hydrolyzed as described. This will vary, of course, with the starting materials and protein-acid ratio in the original solution. Alkali additions should be calculated carefully by qualified laboratory technicians.

Neutralization should not be carried to completion in the glass-lined hydrolyzer, as the alkali might etch the glass. Accordingly, the acidity is reduced to pH 2-3, then the batch is removed from the hydrolyzer and filtered through paper on a rubber-lined iron filtering vessel resembling a Büchner funnel but tremendously larger. Filtration is carried out under vacuum.

Subsequent to filtration, the hydrolysate is adjusted to pH 4-5 in a hardwood tank. At this isoelectric point, as determined by a Beckman Model G pH meter equipped with industrial electrodes, amino acid retention by the product is at a maximum. Now the sauce is ready to be placed in hardwood storage tanks for aging prior to bottling. When properly manufactured, the sauce will have a final salt concentration of 18 percent.

Bottling—It is suggested that the filtered sauce be allowed to remain in the hardwood aging tanks for at least four weeks, after which it may be siphoned off the top and bottled cold. When these tanks are 10 ft. high, the siphon should extend to within about 2 ft. of the bottom. This provides a sedimentation region which should be cleaned out at least once a year.

Mold-enzyme vs. Acid

Quality and Equipment—Five years ago, in the light of chemical knowledge at that time, the following statement might have been justified: "Soya sauce obtained from acid hydrolysis is far superior to that from the mold-enzyme method, since amino acid concentrations are at least five times as great in sauces prepared by the former method." Today, however, we must consider that it is entirely probable that valuable food components produced by the mold-enzyme method are destroyed by acid hydrolysis. We know that acid hydrolysis destroys tryptophane, an essential amino acid, as well as other basic amino acids of biological importance.

Isn't it logical, then, to combine the mold-enzyme method and the acid method and produce half of the total volume of sauce by each method? These individual sauces may then be blended prior to filling. Experience illustrates that a superior flavor results from this practice, which fact in itself provides an incentive for considering this proposal.

The cost of sauce production is approximately the same by either method. However, a higher initial investment is required when the acid hydrolysis method is chosen. Glass-lined equipment also makes maintenance costs higher for the acid process. To counterbalance these important disadvantages of the acid process, labor and overhead costs are low, since batches requiring six to eight weeks by the mold method can be produced in less than two days.

Other factors which might influence the choice of a process for manufacturing soya sauce are as follows:

1. Mechanical difficulties in soya sauce production by acid hydrolysis are greater.
2. It is easier to control the acid process than the mold-enzyme method.
3. The initial cost of acid equipment is higher.
4. Equipment maintenance costs for acid hydrolysis are higher.

Quality Control

Manufacturers of soya sauce have been lax, up to now, in maintaining accurate control of factors affecting the flavor, nutrition and shelf-stability of the sauce. And those intending to manufacture soya sauce should carefully weigh the sales advantage which would result from the adoption of a quality control program.

Necessary to close quality control is technical supervision which insures accurate control of uniformity, amino nitrogen content, pH, moisture, ingredient ratios, salt concentration and keeping quality.

It might also be noted here that blending several separate batches gives a product superior to any straight-run sauce. And aging soya sauce in special wood tanks improves the flavor.

Since the sauce market is flooded with cheap imitations which jeopardize the future of this business in the United States, a Federal standard ought to be established under the Food, Drug and Cosmetic Act.

People in the United States are not acquainted with the true flavor and aroma of "Sho-yu" sauce. And there is a tendency for unscrupulous individuals to capitalize upon this ignorance by cheapening true soya sauce through dilution.

With more technologists and new equipment available after the war, the soya sauce produced in the United States might then excel over the product imported from China and the Orient.

Patent Review

Because hydrolysis is basic to the soya sauce processes, this review of hydrolysis patents may be of interest:

1. Ungnade[5] describes a method for preparing meat sauce from crude protein materials. He hydrolyzed casein by adding three parts by weight of constant boiling (20-21 percent) HCl to one part of casein.

2. Masuda and Royal[6] describe a method for hydrolyzing concentrated Steffens waste water by means of 7 percent alkali. By this process of alkali hydrolysis, followed by careful neutralization and other essential steps, glutamic acid and its compounds are derived from Steffens waste water. In applying their method, racemization of the acid from the d to l form is avoided by careful control of the reaction.

3. Snelling[7] describes a process for hydrolyzing vegetable proteins which includes: (a) hydrolyzing the protein with 5 to 50 percent HCl at 100 deg. C. until hydrolysis is about half complete, neutralizing and (b) completing the hydrolysis with enzymes produced from mold.

4. Matsuoka[8] describes a method for hydrolyzing soybeans by means of a controlled enzyme hydrolysis.

5. Okazaki[9], Satow[10], Jinbo and Hoshizaki[11], and Togano[12] all describe similar processes with individual variation in the basic process of enzyme hydrolysis produced by molds.

References

1. S. Udo, J. Agr. Chem. Soc., Japan, vol. 7, 852-8, 1931.
2. G. M. Dyson, Pharm. Journal, vol. 67, 375-7, 1928.
3. D. D. Van Slyke, J. Biol. Chem., vol. 16, 121-133, 1913-14.
4. F. C. Koch, J. Biol. Chem., vol. 84, 601, 1929.
5. Q. Ungnade, assr. to S.M.A. Corp., U. S. Patent 2,049,576, Aug. 4, 1936.
6. R. Masuda and C. L. Royal, assrs. to Larrowe-Suzuki Co., U. S. Patent 1,947,563, Feb. 20, 1934.
7. W. O. Snelling, U. S. Patent 2,107,133, Feb. 1, 1938.
8. C. Matsuoka, U. S. Patent 1,514,554, Nov. 4, 1924.
9. K. Okazaki, U. S. Patent 923,070, May 25, 1909.
10. S. Satow, U. S. Patent 1,332,448, March 2, 1920.
11. M. Jinbo and K. Hoshizaki, U. S. Patent 1,025,402, June 17, 1911.
12. M. Togano, U. S. Patent 1,394,236, Oct. 18, 1921.

Adding Vitamin D Concentrates TO EVAPORATED MILK

The most direct control over fortification is attained by putting the vitamin D factor directly into the finished standardized evaporated milk. The operation should be supervised by a technologist and checked by the laboratory

By K. G. WECKEL, Department of Dairy Industry, University of Wisconsin, Madison, Wis.

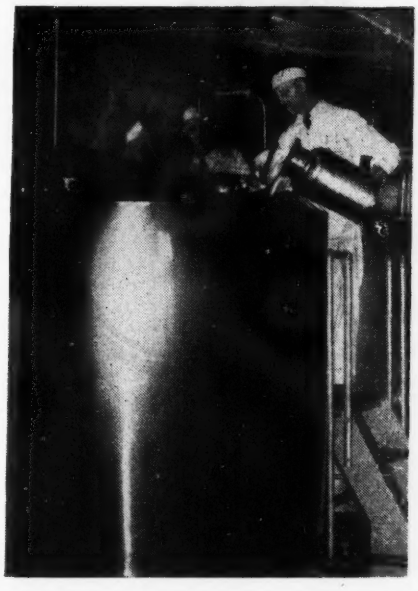
THOSE producing evaporated milk have become interested recently in increasing vitamin D potency from 135 to 400 units per quart of the reconstituted products. This has focused attention upon methods of fortifying the product with prepared vitamin D concentrates. As in the enrichment of other foods, there are production problems which call for special know-how.

Vitamin D_2 (irradiated ergosterol) or vitamin D_3 (activated cholesterol) are available in any one of several forms of concentrates.

Emulsions in Milk

Canned sterile emulsions of the vitamin in fluid milk constituents consist of mixtures of vitamin D in oil or animal fat, homogenized into a milk fluid. Since they are of standardized potency, ranging from 3,000 to 25,000 U.S.P. units of vitamin D per cubic millimeter, and are homogenized, they are perhaps the most convenient and the most reliable of the available preparations.

Once a storage tank of evaporated milk is standardized and its composition properly adjusted, fortification with vitamin D, from the canned homogenized sterile product, is conveniently and quickly done. The necessary volume of the concentrate is determined and is added to the bulk homogenized, cold, evaporated milk. In a tank containing 25,000 lb. of standardized evaporated milk, approximately 560 cu. ml. of a canned homogenized vitamin concentrate containing 16,000 U.S.P. units per cubic millimeter is necessary. Distribution of the vitamin D concentrate in the large volume of stored evaporated milk is readily brought about by the normal agitation employed to obtain uniform distribution of fat and solids-not-fat after standardization. Inasmuch as the vitamin D in the concentrate is dissolved in the fat fraction of the concentrate, and because the fat fraction has been homogenized and dispersed in a media of milk solids, the use of such a concentrate in fortifying a large volume of evaporated milk insures relatively permanent distribution of the vitamin D factor in the fortified canned evaporated milk.



A given quantity of standardized evaporated milk in a storage tank equipped with an agitator may be given a predetermined vitamin D content by adding a known quantity of vitamin concentrate homogenized in a known quantity of evaporated milk. The procedure should be under the supervision of a technologist.

This distribution is of real significance, because the shelf life and storage conditions of evaporated milk frequently are favorable to fat separation. If the vitamin D were improperly dispersed in evaporated milk, fat separation, with consequent zoning of occluded vitamin D, would be possible. Dispersal of the vitamin D in the canned concentrate by homogenization in a manner comparable to that employed for the evaporated milk itself precludes any untoward results. The homogenized sterile concentrate of vitamin D may be used to fortify the milk at any point in the milk flow line. The only requisite to its use elsewhere than at the finished bulk storage tank is a knowledge of the quantities of milk being processed, the ultimate yield of finished evaporated milk, and the assurity of apportionment of the vitamin factor with a given supply of milk destined for a given final storage tank.

Dissolved in Oils

Vitamin D dissolved in vegetable oils or animal fats may be of nearly any degree of concentration up to 1,000,000 units per gram. Normally, however, concentrations of approximately 200,000 units per gram are the more practical for average condensery operations. In this form, the oil or fat must be homogenized, during operations, into the evaporated milk. If not properly and sufficiently dispersed, fat separation of the oil or fat containing the vitamin D can occur. Up to the present, no satisfactory or acceptable procedure for metering the oil into a milk flow line prior to homogenization has been found. At line-flow volumes of 6,000 lb. of evaporated milk per hour, for example, and using an oil containing 200,000 units per cubic millimeter, only 10.8 ml. of oil per hour would be required.

Under certain conditions the quantity of concentrate of vitamin D in oil, necessary for the fortification of a given lot of finished

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How to Control Bin Dryers

Drying progress can be measured by comparing the temperatures of incoming and outgoing air. Air velocity and temperature measurements will indicate whether dryer is efficient. Good and bad bin dryer designs are illustrated

By GEORGE J. BOUYOUCOS and ROY E. MARSHALL,
Michigan Agricultural Experiment Station, East Lansing, Mich.

FOODS undergoing dehydration often are not brought to the final moisture content in the dehydrater. Instead, they are subjected to final drying in bin dryers to insure uniformity.

It is a well-known physical phenomenon that evaporation of water lowers the temperature of the surroundings. So the relationship between the temperatures of the incoming and outgoing air (in bin dryers of proper construction) can be used as a measure of the reduction in the moisture content of the product being dried. The material entering the bin is relatively moist, and since moisture is being evaporated by the incoming hot air, the temperature of the outgoing air at the exhaust duct will be appreciably below that of the incoming air. Establishment of a quantitative relationship between this temperature differential and the existing moisture content of the material undergoing dehydration provides a means of following changes in the moisture content of the product throughout the drying process and of determining when the desired moisture content has been reached. Figures 1, 2, 3 and 4 present some of the salient features of the method.

FIG. 1. Special dial thermometer for bin dryers. Two are needed—one for incoming air, one for outgoing.

Estimating Moisture Content

Figure 1 shows the dial thermometer designed especially for this work and used to measure the temperature of the incoming and outgoing air. It reads from 60 to 140 deg. F. in 1 deg. divisions. Figure 2 shows that when the bin dryer is empty the difference between the temperatures of the incoming and outgoing air is only about 1 deg. F. Figure 3 demonstrates that after the bin had been filled with partially dehydrated potatoes having a 23.9 percent moisture content, the initial temperature difference is 44.2 deg. F. It shows further that as the potatoes became dryer, the temperature of the outgoing air becomes proportionally higher, and that after 14 hours, when the product contains only 6.37 percent of moisture, the temperature of the outgoing air approaches within 9.7 deg. F. of that of the incoming air. Figure 4 shows that when another batch of potatoes containing 8.59 percent of moisture is placed in the same bin, the temperature differential between the incoming and outgoing air is much less than in the preceding case and decreases rapidly to 13.7 deg. F. at the end of the first hour, thereby indicating that the product had a low moisture content from the beginning.

It is evident, therefore, that this method makes it possible to estimate the moisture content of the material in the bin dryer at the beginning or at any time during the drying process and thus to control the amount of moisture in the final product. The proper functioning of the method, however, is dependent upon efficient performance of the bin dryer, a subject to be considered next.

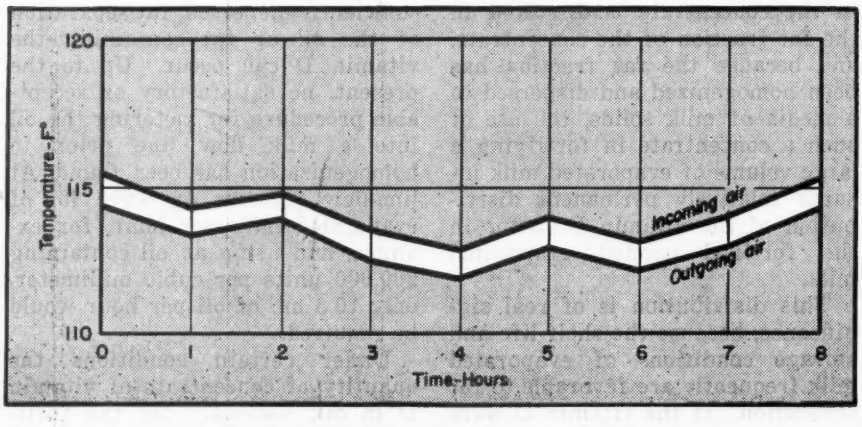

FIG. 2. There is a small differential between the temperature of the incoming air and that of the outgoing air in an empty bin dryer.

Defective Bin Dryers

When this temperature method was applied to bin dryers at various dehydrating plants, it became apparent that certain types did not function effectively, because of improper design and construction. In fact some were practically worthless. Three types of defective dryers will be described.

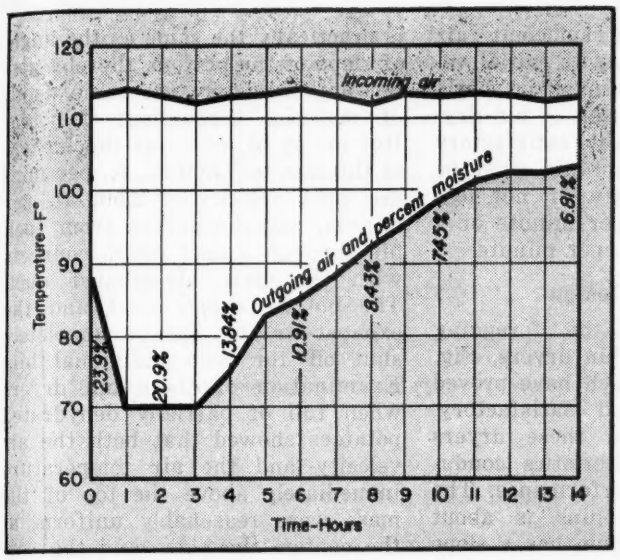

FIG. 3. Relationship between the temperature of outgoing air and the moisture content of potatoes during drying and equalizing in a bin dryer. Relation of temperature of incoming air to that of outgoing air also is shown. At start moisture content is 23.9 percent.

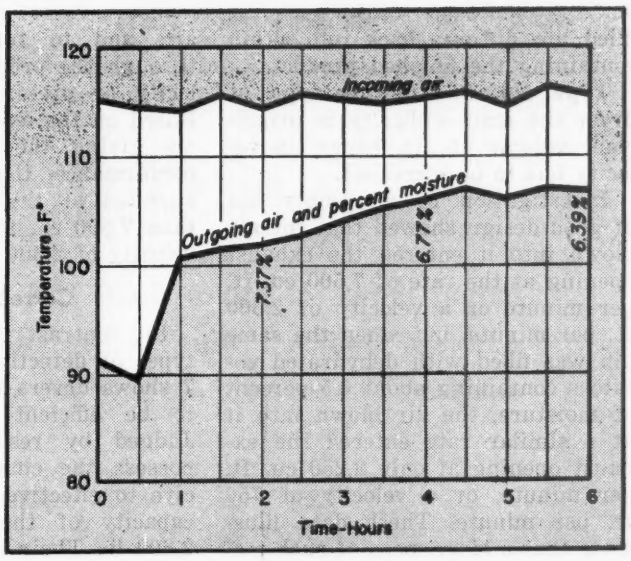

FIG. 4. Same as Fig. 3, except that operation starts with a moisture content of 8.59 percent. Chart shows relation of outgoing air temperature and moisture content of potatoes, as well as relation of incoming to outgoing air temperature.

Type No. 1.—The general plan of these bin dryers is shown roughly in Fig. 5. The main characteristics are: (1) The bottom has a 53 deg. slope, and (2) the air blows into all the bins during operation, even though only one bin may be filled and the remainder empty.

In examining filled bins of this type (Fig. 5), it was found that most of the incoming air which entered at the bottom followed along the underside of the incline through the shallow portion of material and out the exhaust duct instead of through the mass of material as intended. This was indicated by the fact that at the exhaust duct the air velocity was 350 ft. per minute, but at the top of the deepest material it was only 10 ft. per minute. Moreover, the temperature of the outgoing air at these respective positions was 113 and 81 deg. F. The latter temperature was approximately that which the product had attained by remaining in the bin overnight, and it had not changed appreciably six hours after the hot air was turned on. That evaporation was not responsible for keeping this temperature low was evident from the fact that the moisture content of the material was only 6.7 percent when it was placed in the bin, and the real reason it remained low was because the hot air failed to heat the material.

Type No. 2.—The general plan of these bin dryers is shown roughly in Fig. 6. Investigation of such bins in one plant disclosed that the hot air which entered at the two opposite sides had a tendency to travel along the walls of the bin and out into the exhaust duct instead of going through the material with which the bin was filled.

It was also found that because of the above undesirable features in the exhaust openings and air exhaust duct it was impossible to control completely the temperature and air movement in any individual bin. For example, when the hot air was turned on in any one bin it eventually entered all of the other bins from the top. This is especially objectionable when the moist exhaust air from a freshly

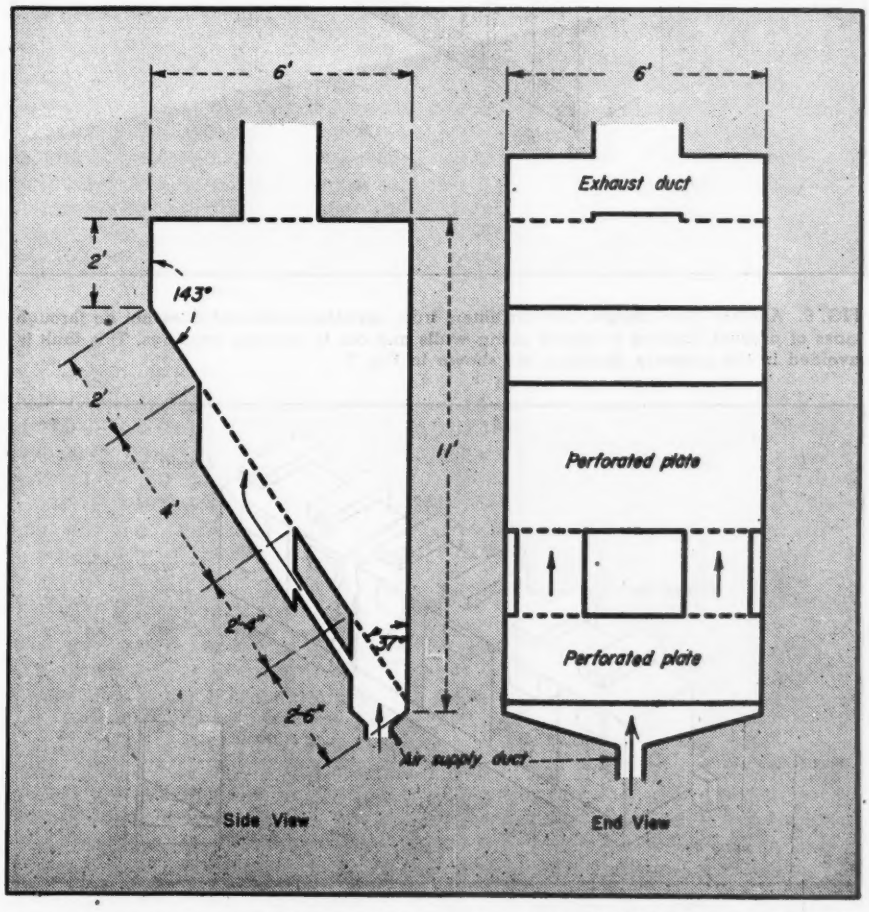

FIG. 5. Bin dryer of poor design. Hot air does not go through mass of product but travels chiefly along steep bottom and out to exhaust duct.

filled bin diffuses back into a bin containing the finished product.

Type No. 3.—In this type of dryer the main difficulty is insufficient volume of air, hence its velocity has to be increased.

Investigation of an empty bin of good design showed that the air blown into it entered the exhaust opening at the rate of 7,500 cu. ft. per minute or a velocity of 2,500 ft. per minute, but when the same bin was filled with dehydrated potatoes containing about 6.5 percent of moisture, the air blown into it at a similar rate entered the exhaust opening at only 2,250 cu. ft. per minute, or a velocity of 750 ft. per minute. These data illustrate that a large mass of such material in considerable depth offers great resistance to the passage of air, and to force sufficient air through the product, its initial velocity or pressure must be high. Based on the operation of bin dryers giving the most satisfactory performance, the hot air must be supplied at the rate of not less than 7,500 cu. ft. per minute or a velocity of 2,500 ft. per minute.

Correct Design

In contrast to the foregoing types of defective bin dryers, Fig. 7 shows dryers which have proved to be efficient and satisfactory. Judged by results, these dryers possess the characteristics conducive to effective performance. The capacity of these bins is about 2,800 lb. Their bottom has a slope of 30 deg., and when they are filled, the angle of repose of the material is practically the same as the angle of slope of the bottom, thereby giving approximately the same depth of material throughout the bin. Hot air is blown in at the bottom at the rate of 7,500 cu. ft. per minute, or a velocity of 2,500 ft. per minute, and discharges from each bin through a duct which connects with the main air-exhaust duct. The hot-air supply duct and the exhaust-air duct can be completely shut off for each individual bin. Examination of these bin dryers when full of partially dehydrated potatoes showed that both the air velocity and the air temperature immediately above the top of the mass were reasonably uniform at the center, the sides and the corners, thereby indicating that the hot air was being forced uniformly through the entire mass of material.

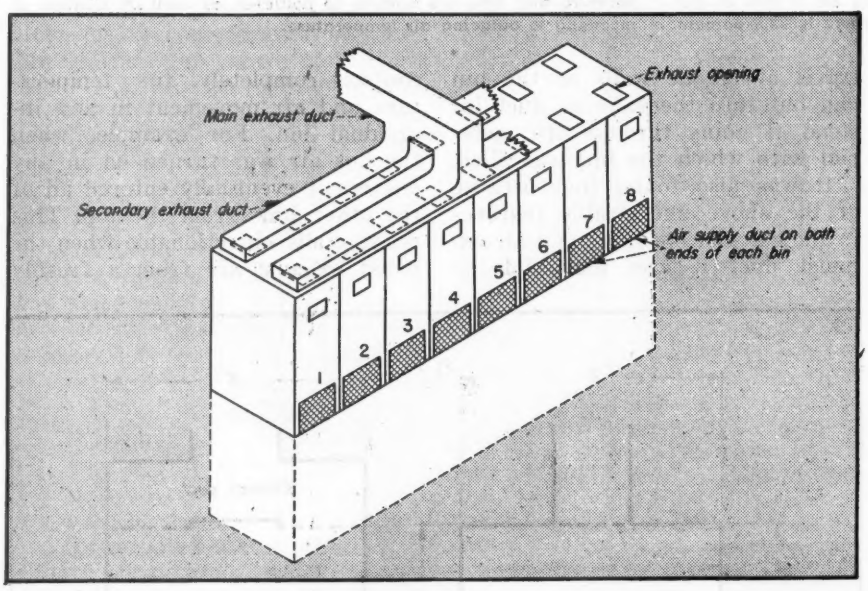

FIG. 6. Another poor design. Hot air enters from opposite sides and does not go through mass of product. Instead it travels along walls and out to exhaust openings. This fault is avoided in the properly designed bin shown in Fig. 7.

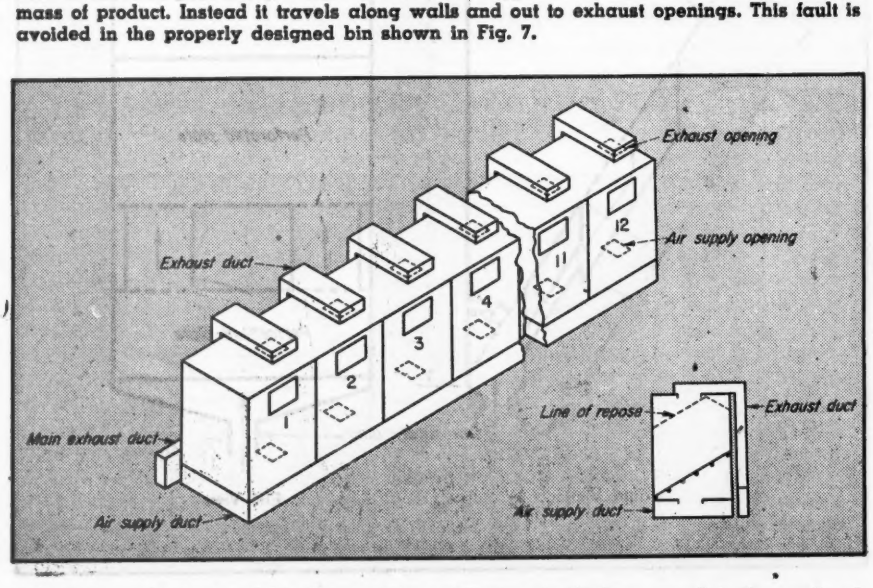

FIG. 7. Properly designed bin dryers. Slope of bottom is 30 deg., equal to the angle of repose of the product to give uniform depth. Air is blown in at bottom, discharged at top, with cutoff for each bin.

Checking Bin Dryers

As previously inferred, either the temperature method or air-velocity measurements will serve to indicate whether or not bin dryers function efficiently. Although the temperature method is more convenient, the air-velocity technic is more inclusive.

In using air velocity measurements as a check on the performance of a dryer, the procedure consists of measuring the velocity of air by means of an anemometer at the sides, corners and center of the bin immediately above the material being dried. If the air velocity at these various points is approximately the same and approaches that of the outgoing air at the exhaust opening, the bins are functioning properly. This latter conclusion would be particularly well substantiated if the performance were similar in more than one bin in the series.

If the temperature method is used to check performance, the procedure consists of placing the bulb of the dial thermometer at various positions in the bin near the top of the material being dehydrated and reading the temperature at each position. If the temperature is approximately the same at the different positions — which should include the corners, sides and center of the bin—the dryer is functioning correctly.

The temperature method for determining moisture content also can be used to reveal whether bin dryers are of proper design and construction and whether they function properly.

Sweet Potato Concentrate Yields Pro-Vitamin A

Another byproduct source of carotene has been found in sweet potato starch production. The process outlined yields pulp for feed, a starch fraction for refining and a carotene-protein concentrate high in beta carotene

By D. M. BATSON, R. T. O'CONNOR and N. PORGES,
Southern Regional Research Laboratory, New Orleans, La.*

RECOVERY in concentrated form of almost half of the carotene originally present in sweet potatoes, in a fraction which weighs only 2 percent of the original weight of the raw material, has interesting possibilities. With a carotene content of 870 mg. per kilogram, an experimentally produced concentrate was appreciably higher in carotene than most plant materials, such as dried alfalfa and soybean leaves, ordinarily utilized either as a carotene supplement for cattle feeds or in solvent extraction for the preparation of carotene concentrates. For extraction purposes, such a sweet potato coagulum should be a desirable carotene source, since, unlike leafy materials, it contains no chlorophyll. Furthermore, practically all of this carotene is the biologically active beta isomer (or isomers).

A previous report[1] from this laboratory pointed out that certain varieties of the sweet potato have yellow to red colored fleshy roots that contain sufficient amounts of carotene, or provitamin A, to serve as a good source of vitamin A for meeting human and animal requirements. The carotene is present in the form of minute particles or crystals which are located inside the starch-filled cells of the parenchymatous tissues. A mechanical concentration method for separating a sweet potato fraction that contained two to four times as much carotene per unit weight as there was in the original sweet potatoes was described at that time.

More recently, in connection with investigations to extend the utilization of certain byproducts of sweet potato starch manufacture, a study was made of the distribution of carotene in the major fractions obtained by processing high-carotene sweet potatoes for starch. These fractions, prepared on a small pilot-plant scale under conditions simulating commercial operations, were:

1. The pulp obtained by grinding the sweet potatoes in a hammer mill with a three-fold quantity of water and washing out the liberated starch through a shaker screen.

2. The starch separated from the starch milk by gravity sedimentation.

3. The supernatant liquor from sedimentation of the starch. This liquor contained sugars, salts, proteinaceous material and other dissolved or dispersed constituents.

Spectrophotometric determinations showed that the pulp contained approximately one-tenth of the carotene originally present and that the starch contained only a trace. The major portion, then, must be in the supernatant liquor fraction.

On the assumption that the carotene in the liquor was present as suspended discrete particles or crystals, it was considered likely, and found to be the case, that the carotene particles would be largely entrapped, carried down and concentrated in the coagulum obtained by acidification, as in a procedure for recovery of dispersed protein.[1,2] This procedure involves acidifying the liquor to approximately pH 4.0 to effect the initial coagulation, heating to boiling to accelerate coagulation and cause the coagulum

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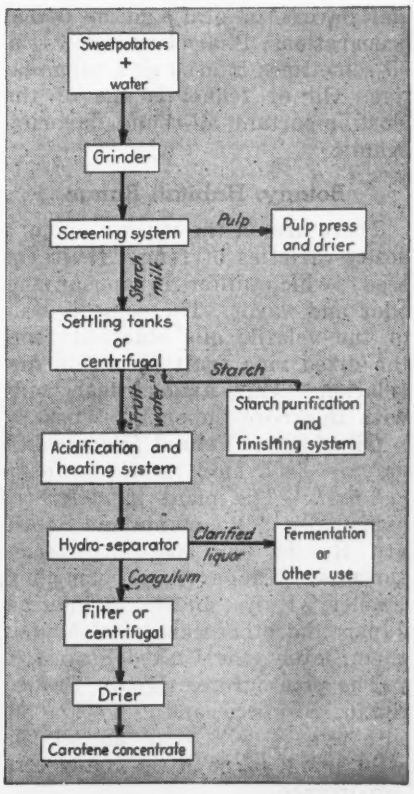
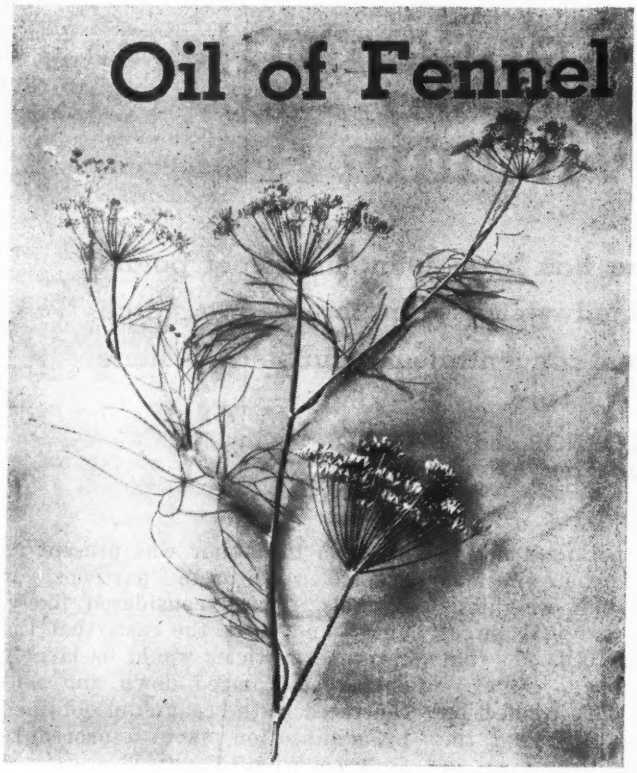
*One of the laboratories of the Bureau of Agricultural and Industrial Chemistry, Agricultural Research Administration, U. S. Department of Agriculture.

Distribution of Carotene Among Sweet Potato Fractions.
These results are typical of the Porto Rico variety, which is high in carotene

Fraction	Weight grams	Moisture content percent	Proportion of original weight percent	Carotene content mg./kg.	Total carotene mg.	Proportion of original carotene percent
Original	15,000	66.0	100.0	37.8	567.0	100.0
Pulp	1,595	8.8	10.6	28.1	44.8	8.0
Starch	1,995	7.2	13.3	2.3	4.6	0.8
Coagulum	300	5.4	2.0	870.0	260.0	46.0



Flow sheet showing the sequence of operations to produce the protein coagulum which carries with it almost half of the original carotene in 2 percent of the original weight.



Oil of Fennel Its Sources, Characteristics

One of the most important all-round flavoring agents, oil of fennel, is used in bread, pastry and confectionery. That users may know this material better, the author discusses its production and lists physical and chemical characteristics.

By ERNEST GUENTHER, Chief Chemist
Fritzsche Brothers, Inc., New York, N. Y.

The fennel plant. (Photo courtesy Bureau of Plant Industry.)

OIL of fennel is a popular flavoring agent in culinary preparations bread, pastry, confectionery and liqueurs. It also is employed to correct the less pleasant odors and flavors in oral and medicinal preparations. Pharmaceutically, the oil sometimes is used as a carminative. Oil of fennel is one of the most important all-round flavoring agents.

Botany, Habitat, Range

There are on the market about a dozen varieties of fennel fruit (or seed) which differ in appearance, odor and flavor. The same is true of the volatile oils obtained from the dried ripe fruit by steam distillation. This article deals only with the more important types.

Oil of Bitter Fennel (*Foeniculum vulgare Mill. syn. Anethum foeniculum L.*—The plant is *cultivated* principally in Roumania and Southern Russia, but also in Czechoslovakia, Hungary,[1] Germany, France, Italy, India, Argentina, Japan and other countries—among them, lately, the United States.

The plant grows *wild* in France, Spain, Morocco and Algeria, but although it will yield an oil, the wild plant is of little commercial importance.

Oil of Sweet or Roman Fennel Seed. Also called French *Sweet* Fennel (*Foeniculum vulgare Mill.* var. *dulce* Bert.)—This plant is *cultivated* in France, Italy and Macedonia. The oil is distilled from the seed.

Foeniculum vulgare Mill. is a herbaceous perennial, 4 to 5 ft. high, which has been known since antiquity in Europe and the Far East. The dried, aromatic fruits, or seeds, are widely employed in culinary preparations, for flavoring bread and pastry, in candies, alcoholic liqueurs of French type, as well as in oral and medicinal preparations.

Foeniculum vulgare bears finely divided, narrow, almost thread-like leaves; the compound umbels of yellow flowers carry 10 to 20 rays, each ray ending in a smaller umbel. Small flowers, containing five petals, appear in July. The oval-shaped, greenish fruit varies in length from 4 to 10 mm. Odor and flavor are strong and sweet but possess a somewhat bitter "by-note."

Foeniculum vulgare var. *dulce*, the French sweet or Roman fennel, resembles *Foeniculum vulgare* but is a much smaller plant, only about 1 ft. high. The rays in the umbel number only six to eight; its flowers appear earlier. The young, sweet shoots, or turions, are relished in Italy as a salad or in boiled form. The dried seed has a very sweet, warm, agreeably aromatic odor and flavor without any bitter "by-note."

Fennel grows wild on almost any good soil, especially on nonacid, sandy and chalky ground, in sunny localities with a fairly mild climate. It thrives best in rich, well-drained loam or black, sandy and sandy clay soils which contain sufficient lime. Too much dampness or moisture favors excessive development of leaves and stalks rather than seed, a feature undesirable from the producers' viewpoint.

Growing and Preparing

Crooks and Sievers[3] point out that although fennel is readily grown from seed, it also can be propagated by root and crown divisions. The seed may be sown directly in the field, in late fall or early spring. It is sown thickly in drills, 2 or 3 ft. apart, and covered lightly. According to Stockberger,[4] 4 to 5 lb. of seed is required per acre, while Willkie and Kolachov[5] claim that 7 to 9 lb. is required. When well established, the plants may be thinned to stand 12 to 15 in. apart in the raw. The plants also may be started in a seedbed and transplanted to the field when 3 to 4 in. high. The cultivation required is the same as for ordinary garden crops.

As a rule, very little seed is produced the first year, but full crops may be expected in succeeding years. The seed should be harvested in fall, before it is fully ripe but when sufficiently hard and of

greenish-gray color. When harvesting by hand, it is possible, according to Crooks and Sievers,[6] to gather the more mature umbels first and go over the plants again once or twice when the remainder have matured. The harvested material must be dried; it may be spread on a dry floor or in the open if the weather is favorable.

Harvesting by hand requires much labor, but it appears to be the only way of gathering all the seed at the most desirable stage. Cutting the entire tops at one time with machinery, stacking in the field until fully cured and dried (which takes three to four days) and then threshing with a modified grain thresher, seems to be the only procedure for handling the crop with low labor cost. In this case, some seed undoubtedly will be lost. If too ripe, it will shatter; if too immature, it will not be of good quality when cured.

Crooks and Sievers[7] estimate the yield of fennel seed at 600 to 800 lb. per acre, although small experimental plots have, in some cases, indicated substantially larger yields. Willkie and Kolachov[8] claim 1,000 to 1,400 lb. of seed per acre.

Domestic Production

Crooks and Sievers[9] believe that fennel is adapted to the Central and Northern states and probably to certain sections of California, where in some places it has escaped from cultivation and grows to a large size. The seed can be sown directly in the fields. And after the first year, the plants are of such size that no hand cultivation or weeding is required. On the other hand, economical harvesting without considerable loss of seed seems improbable, and gross returns are not believed adequate to justify much hand labor. The opportunity for growing fennel is, morever, limited. Less than 500 acres is needed to supply normal annual domestic requirements. This, however, does not take into account the considerable quantities of fennel oil which we imported before the war.

Distillation

The seed must be crushed previous to distillation, and then distilled immediately to avoid loss of oil by evaporation. The yield of oil usually varies between 4 and 5 percent, but should be at least 2½ percent. Old seed is liable to give a lower yield than dried seed from the latest harvest.

According to Clevenger,[10] the yield of volatile oil varies considerably, being highest in seed of German and Roumanian origin and lowest in East Indian seed.

Distilling fennel seed in Seillans (Var), France, the author, obtained the following yields of oil:

French seed .....2.5 to 3.0%
Levant seed .....around 1.4%
Spanish seed .....around 3.75%

During distillation it is important to keep the temperature of the condenser high enough to prevent the oil from congealing. The distillation residues, after drying, represent a valuable cattle feed, containing 14.0 to 22.0 percent of proteins and 12.0 to 18.5 percent of fat.

Physico-Chemical Properties

Oil of Bitter Fennel—The properties of oils distilled from cultivated bitter fennel seed (*Foeniculum vulgare* Mill.), according to Gildemeister and Hoffmann,[11] vary between the following limits:

Specific gravity at 15 deg. C.—0.965 to 0.977.
Optical rotation— +11 deg. 0 min. to +24 deg. 0 min., usually 11 deg. 0 min. to +20 deg. 0 min.
Refractive Index at 20 deg. C.—1.528 to 1.539.
Congealing Point[12]—Not below +5 deg. and as high as +10 deg. in good oils. Oils of somewhat inferior quality may have a congealing point as low as +3 deg., which must be considered the lowest limit.
Solubility—Soluble in 5.0 to 8.0 vol. of 80 percent alcohol (sometimes with slight turbidity), and in 0.5 vol. of 90 percent alcohol.
(See also properties listed in the Twelfth Revision of the U. S. Pharmacopoeia.)

Oils distilled in the U.S.S.R. from the seed of cultivated bitter fennel, and analyzed in the New York Laboratories of Fritzsche Brothers, Inc., had the following properties:

Specific gravity at 25 deg. C.—0.971 to 0.973.
Optical rotation— +14 deg. 15 min. to +15 deg. 45 min.
Refractive Index at 20 deg. C.—1.5331 to 1.5370.
Congealing Point— +4.4 to +5.2 deg.
Solubility at 25 deg. C.—Soluble in 4.0 to 5.0 vol. and more of 80 percent alcohol; soluble in 0.5 vol. and more of 90 percent alcohol.

The oils distilled from the entire overground parts of wild growing bitter fennel (*Foeniculum vulgare* Mill.) during the early fruiting period seldom congeal, even in a freezing mixture, because they contain very little anethol. They usually show a strongly positive phellandrene reaction. As the seed ripens, the anethol content increases, and it is advisable to harvest the wild plants as late as possible. This rule, however, is not always followed in Morocco, Algeria or Spain. Commercially these oils are unimportant.

In Morocco, *Foeniculum vulgare* Mill. grows spontaneously in most regions where pennyroyal occurs, especially on the great plains between the Sebou and Defale rivers. Since sheep and other herbivorous animals feed on these plants, only limited quantities of oil could be produced, perhaps 4 to 5 tons a year at most. When distilled during seed formation in July, the plant yields about 0.7 percent of oil. Distillation of one batch of 100 kilos of plants requires 1½ to 2 hours. If the material is distilled prematurely, the yield of oil is only 0.5 percent.

An oil of wild fennel distilled from stalks, flowers and leaves during the author's visit to the Medium Atlas in 1937, had these properties:

Specific gravity at 25 deg. C.—0.879.
Optical rotation— +57 deg. 50 min.
Refractive index at 20 deg. C.—1.4689.
Congealing point—The oil did not congeal when cooled to —20 deg.
Phellandrene reaction—Strongly positive.
Solubility—Not clearly soluble in 80 percent alcohol, up to 10 vol.; soluble in 0.5 vol. and more of 90 percent alcohol.

From these properties, it appears that the oil contained very little, if any, anethol, having been distilled before seed formation.

Oil of French Sweet or Roman Fennel Seed (*Foeniculum vulgare*

Bureau of Plant Industry

Fennel growing under cultivation.

Mill. var. *dulce* Bert.)—The yield of these oils varies from 2.5 to 3.0 percent. Their quality is outstanding due to the high content of anethol and absence of fenchone. According to Gildemeister and Hoffmann,[13] the properties of sweet fennel oils vary between these limits:

Specific gravity at 15 deg. C.—0.976 to 0.980.
Optical rotation— +5 deg. 0 min. to +16 deg. 30 min.
Congealing Point— +10.0 to +14.5 deg.

Oils distilled by the author in Seillans (Var), France from the seed of sweet fennel, possessed the following properties:

Specific gravity at 25 deg. C.—0.971 to 0.978.
Optical rotation— +4 deg. 15 min. to +5 deg. 4 min.
Refractive Index at 20 deg. C.—1.5500 to 1.5519.
Congealing Point— +13.3 to +14.8 deg.
Solubility at 25 deg. C.—Soluble with haziness in 8.0 to 9.0 vol. of 80 percent alcohol; soluble in 1.0 vol. and more of 90 percent alcohol.

During the past eight years, Clevenger[14] analyzed representative samples of many shipments of all kinds of fennel seed entering the port of New York. He determined the yield of volatile oil and physicochemical characteristics. The seeds were grouped into six classes: Roumanian, Argentinian, German, French, East-Indian and Italian. The bitter fennel, usually of Italian origin, varied considerably in size and also varied greatly in apparent maturity.

The investigations of Clevenger led to the conclusions listed below:[15]

1. The specific gravity that was found for each group of fennel seed is considered to be within the range of expectancy. It ranges from 0.951 to 0.991 at 25°/25°.

2. The optical rotation for each of the oils is positive and varies from +3 deg. 30 min. to +22 deg. 6 min. In general, the oils of the Roumanian, German and Italian (bitter) fennel gave uniformly high positive rotations.

The oils of the Argentinian and French seed gave distinctly lower positive rotations. The optical rotation of the oil from the French seed shows considerable variation.

3. The refractive indices of all the oils are reasonably uniform. The refractive indices of oils from the bitter fennel are definitely lower than those of the other varieties.

4. The congealing temperatures for most of the oils are reasonably uniform (from +1.0 to +12.5 deg.), except that the oil from one shipment of seed from Argentina congealed at —3.0 deg. The oils from the bitter fennel would not congeal even when the temperature was lowered to —15.0 deg.

Chemical Composition

The chemical composition of fennel oil differs considerably according to the plant variety from which the oil has been distilled, and according to the regions of origin. Needless to say, the seed oils are quite different from the herb oils. Our food, beverage and pharmaceutical industries employ seed oil almost exclusively.

Oil of Bitter Fennel (*Foeniculum vulgare* Mill. syn. *Anethum foeniculum* L.)—The plant is *cultivated* and the oil is obtained from the seed by distillation. The following constituents have so far been identified:

d-pinene—Identified by the Schimmel chemists[16] in the fraction b.p. 157-160 deg. at 760 mm.; nitrolbenzylamine m.p. 122 deg.

camphene—Conversion with glacial acetic acid-sulfuric acid into isobornyl-acetate b.p. 65 deg. at 12 mm., and saponification of this ester to isoborneol m.p. 208.5 deg.

d-α-phellandrene—In the fraction b.p. 49.2-55 deg. at 7 mm.; α_D +34 deg. 34 min. Identified as nitrite m.p. 114 deg. by the Schimmel chemists.[17]

dipentene—Identified in the fraction b.p. 180 deg. at 760 mm. as dihydrobromide m.p. 94 deg. and as tetrabromide m.p. 123-124 deg.

anethol—Investigations on this phenolic ether, the main constituent of fennel seed oil, date back as far as the end of the eighteenth and beginning of the nineteenth century. Good fennel seed oil contains 50 to 60 percent of this compound. It can be isolated by freezing the oil or its corresponding fractions. Anethol is white, crystalline, of intensely sweet anise-like odor and flavor. At 22.5 deg. it melts to a colorless, optically inactive, strongly refractive liquid of anise-like odor and very sweet taste. Under the influence of light and air, or heat, anethol loses its ability to crystallize, assuming simultaneously a viscous consistency, a yellow color and a somewhat bitter, disagreeable taste. This is accompanied by an increase in the specific gravity above 1, and a better solubility in dilute alcohol. It is still doubtful whether the change is caused, according to de Varda,[18] by polymerization of anethol to photoanethol or, according to Hoering and Graelert,[19] by oxidation to anisic aldehyde, anisic acid, and other products of oxidation, among them di-p-methoxy stilbene. The last named compound is quite insoluble and, therefore, freshly prepared anethol upon standing sometimes becomes turbid. It is possible that di-p-methoxy stilbene is not formed directly from anethol but from anisic aldehyde as intermediary product of reaction. It is interesting to note that anethol is not present, or only in small quantities, in oils distilled from the fruiting tops of wild growing bitter fennel. Aside from anethol, bitter fennel seed oil contains another oxygenated compound.

d-fenchone—According to Wallach and Hartmann,[20] a ketone of intensely bitter, camphor-like odor and flavor. Fenchone is present only in the bitter fennel seed oils and responsible for their somewhat coarse, bitter taste. It does not occur in oils distilled from sweet or Roman (French) fennel seed (*Foeniculum vulgare* Mill. var *dulce*).

A further oxygenated constituent of bitter fennel oil is:

methyl chavicol—Identified by Tardy.[21] It has a slight anise-like odor, but not the sweet flavor of anethol. Methyl chavicol is liquid at room temperature and, like anethol, optically inactive.

foeniculin—A phenolic ether, $C_{11}H_{14}O$, of unknown structure was reported by Takens.[22] It resembles anethol and occurs in the fraction b.p. 150 deg. at 4-5 mm., b.p. 147 deg. at 5 mm., $D_{15\ deg.}$ 0.967, α_D ±0, congealing point 21.5 deg. Spaeth and Bruck[23] identified this phenolic ether as p-anol prenyl ether (prenol is γ, γ-dimethylallyl alcohol) and named it foeniculin.

aldehydes—And traces of... *basic constituents* — Of disagreeable pyridene-like odor and giving a faint pyrrole reaction, were found[24] in the first runnings of fennel seed oil.

anisic aldehyde and anisic acid—The oxidation products of all oils containing anethol, also occur in fennel seed oil.

The plant also grows *wild*. Oils distilled from the overground parts of the plants during the fruiting period contain but little, if any, anethol.

Their chemical composition was investigated by Wallach,[25] by the Schimmel chemists[26] and by Tardy,[27] who identified the following constituents:

d-α-phellandrene—The main constituent.
pinene.
anethol—Very little if any.
fenchone.
methyl chavicol.
a sesquiterpene.
a compound, $C_{10}H_{14}O_2$—Probably thymohydroquinone.
i-ethylfenchyl alcohol (?)—Occurs, according to Dorronsoro,[28] in the highest fractions of oils distilled near Cordoba. Dorronsoro, however, gives no details of identification.

Oil of Sweet or Roman Fennel Seed; also called French *Sweet* Fennel (*Foeniculum vulgare* Mill. var. *dulce* Bert.)—The plants are cultivated and the oils are distilled from the seed. According to the Schimmel chemists,[29] the oil contains:

d-phellandrene.
d-limonene.
anethol—The very high percentage of anethol and the absence of fenchone account for the delicate, sweet odor and flavor of these oils. They represent undoubtedly the finest quality of fennel oil produced.

References

1. Guenther, Hungarian Essential Oils, *American Perfumer*, 42, July, 1938.
2. See also Stockberger, Drug Plants Under Cultivation, U. S. Department of Agriculture Farmers' Bulletin No. 663, 22; Willkie and Kolachov, The Domestic Production of Essential Oils From Aromatic Plants, National Farm Chemurgic Council Bulletin, 28, 1940 (Columbus, Ohio).
3. Condiment Plants, U. S. Department of Agriculture, Bureau of Plant Industry, 19, July, 1941.
4. *Op. cit.*
5. *Op. cit.*
6. *Op. cit.*
7. *Ibid.*
8. *Op. cit.*
9. *Op. cit.*
10. *Association of Agricultural Chemists* XXV, 4, 962.
11. *Die Atherischen Öle*, 3d Ed., Vol. III, 516.
12. For determination of the congealing point, see U.S.P., XII, 566.
13. *Ibid*, 521.
14. *Association of Agricultural Chemists* XXV, 4, 962.
15. For exact figures see tabulation in the original literature.
16. *Ber. Schimmel & Co.*, April, 1906, 29.
17. *Ibid.*
18. *Gazz. chim. ital.* 21 (1891), I. 183.
19. *Ber.* 42 (1909), 1204.
20. *Liebigs Ann.*, 259 (1890), 324; 263 (1891), 129.
21. *Bull. soc. chim.* III, 17 (1897), 660.
22. *Chem. Zentr.* 1929, II, 1755.
23. *Ber.* 71 (1938), 2708.
24. *Ber. Schimmel & Co.*, April, 1906, 29.
25. *Liebigs Ann.*, 239 (1887), 40.
26. *Ber. Schimmel & Co.*, April, 1901, 12.
27. *Bull. soc. chim.* III, 17 (1897), 661—"Etude analytique sur quelques essence du genre anisique," *Thèse*, Paris, 1902, 23.
28. *Mem. acad. cienc. exactas*, Madrid, 29 (1919).
29. Gildemeister and Hoffmann, *Die Atherischen Öle*, 3d Ed., Vol. III, 522.

EDITORIALS

LAURENCE V. BURTON, Editor

A Mystery No Longer

IF you happen to be a little puzzled as to what good is a food technologist, may we suggest that you read the several articles appearing in FOOD INDUSTRIES on what food technology means to the various branches of the industry. There is one on page 71 of this issue. Another, in two parts, appeared in the May and June numbers.

We are very well acquainted with that least understood of all professional men—the food technologist—but we must confess that these articles have shown him to be even more versatile and useful in everyday food plant operations than we had realized.

Good News

WE understand—though we can't name any authority—that WPB, realizing that "we need food damn badly," is in the process of readjusting priorities for food equipment manufacturers so as to give processors what they need to help alleviate the critical food shortage.

At long last, the people and agencies who are directing the affairs of this country have learned the importance of food and of the food processor. They had to learn it the hard way—hard on everyone in the world—but it's a lesson they may not forget for a while.

Hang onto Research and Technical Specialists

THESE remarks are addressed to presidents or owners of food businesses. Most folks in the business field have few contacts with universities and are unaware of the appalling situation that has developed in institutions of higher learning. Graduate as well as undergraduate students have been drafted into the armed forces. Faculties have been depleted. Result: Few trained research workers are now being turned out, and fewer still are in prospect.

Scientific Bankruptcy

Worse yet, the postwar prospect is far from reassuring. President W. E. Wickenden, Case School of Applied Science, views the future as "the road to scientific bankruptcy." The war has so depleted the technical and scientific brains of the country that it may well require many years, or even decades, to regain the place we once held in 1940.

Failure of Congress to adopt a long-range policy has resulted in using future research scientists for cannon fodder. Germany, it is said, did not make that error; nor did Russia.

Unfortunately, no effective corrective measures are possible today. The dead and maimed cannot be recalled.

What can a food manufacturer do to mitigate the bad situation that lies ahead? He can hang onto good research men presently in his employ by keeping them happy and paying them enough to be satisfied where they are. He can also avoid raiding university faculties for researchers. One good man in a university can develop from four to ten promising graduate students into good research workers in from two to four years. But if industry takes away the teacher of research methods, the training program stops—dead.

It would seem to be the wiser policy to hang onto any good men in a firm's employ. Once gone, they are likely to be irreplaceable.

Electronics vs. Argentine Meat

So far, electronic heating has had no significant commercial applications in the food processing industries. But one is showing enough promise, according to a food technologist and a manufacturer of electronic heating apparatus, to constitute a possible future problem in international meat distribution. As everyone in this country knows, raw Argentine beef has been banned by the United States on the alleged basis that importation of it might bring the hoof and mouth organism into this country and contaminate our cattle. With an eye to a lucrative market in this country, technologists in Argentina have done a little experimenting with electronic heating to kill the hoof and mouth germ in meat. And they have found that it works. Small cuts of meat are exposed to dielectric heating for a short period until the temperature rises uniformly throughout the cut to 140 deg. F. This is said to kill the hoof and mouth bacteria, yet leave the meat uncooked so that it still may be marketed as a fresh product. Meat cuts so treated are then packaged and frozen for shipment abroad. The cost is not prohibitive.

This development has been carried far enough to indicate possibilities. It is not yet a commercial thing. It is something, however, for American meat packers to think about. The farm lobbyists in Washington, too, will probably be cooking up a new angle on Argentine beef. It looks as if the hoof and mouth disease maneuver is about to be outflanked.

Better Get Ready For Postwar Squeeze

STATISTICS significant to postwar planning have been compiled by OPA. These show that the production of manufactured food products was 52 percent higher in 1944 than in 1935-39, that the cost of raw materials from the farm rose 39.6 percent between October, 1941, and December, 1944, and that hourly wage rates increased 25.9 percent on a straight-time basis from December, 1941, to August, 1944.

In the postwar period, all of

these figures probably will drop, but the volume of production may be expected to decline more than the cost of raw materials and considerably more than the cost of labor. This not only will mean strong competition in the postwar food business but it will call for efficient operation to make a satisfactory profit after paying for raw materials and meeting the payroll.

In all probability it will be many months before the world's demands for food from this country fall below our capacity to produce. And the more progressive food company executives are going to use that period of grace to study ways and means of cutting processing costs through more efficient plant operations and of reducing distribution costs by minimizing uneconomical practices.

Greater plant efficiency is one for the engineers to work out, but top management must give someone the assignment. Saving in distribution expense is one for top executives themselves to ponder. And in doing so they may well pay heed to wartime economies from such things as the elimination of unprofitable delivery routes and small accommodation shipments, savings in financing and storage costs by faster inventory turnover and economies effected by curtailment of consignment selling.

Postwar success in the food industry will in no small measure be determined by wartime planning.

Know the Food in Terms Of Its Package

IT is reported by an authority that the biggest advance in the pulp and paper industry during the war years has been the self-education of the paper technologist to understand food packaging problems. The next advance will come when the food technologist teaches himself to understand his products in terms of packaging.

We are told that a check list of almost 70 questions is necessary to assure adequate data for a packaging study on almost any food product. And most of these questions must have answers that tell how much, as well as what. In other words, the package supplier needs specific information.

Certainly there are a lot of the decisions that are not in the province of the food technologist. Market research must determine the best size for the unit package and the type of package most likely to be accepted by the consumer. Accounting will contribute the permissible packaging cost, which takes in both materials and operating expenses. The sales department must estimate the desirable turnover and hence the shelf life to aim at. These can all be expressed in dollars or days or other quantitative units.

There may be an excuse for the food man not to be able to supply some of the data. Quantitative answers may require fundamental research. How do you state exactly how sticky a food is, how much tendency there is for the oil to "creep," or just what is the liability to loss of the volatile aromatics? These are all practical problems from the standpoint of container selection.

On the other hand, many of the properties that are important in package selection, such as moisture equilibrium and safe moisture range, abrasiveness, sensitivity to light, are easy enough to determine. The food technologist who learns to think of his products in terms of packageability will be prepared with data such as this before the question of picking a new package or sticking with the old one again becomes a question requiring a quick and definite answer.

Tested Formulas Are Best For Sales Promotion

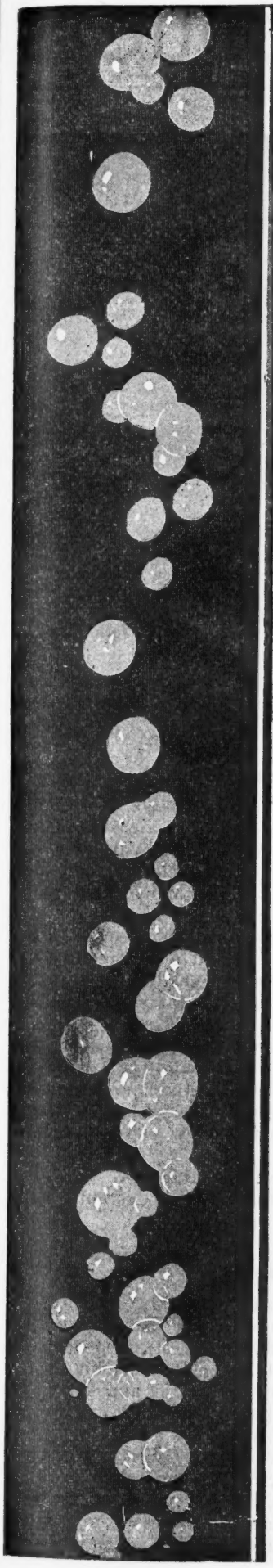
THOSE food manufacturers whose products are often used as ingredients by other food manufacturers often develop formulas to illustrate the best way of utilizing the ingredient. As such, the formula can be an excellent piece of sales promotion, but it may be a hazard when its language and directions are ambiguous—or just plain sketchy.

Some concerns do an admirable job in this field and put out formulas that are so easily prepared that no one could go wrong. Even a novice could follow the directions. Other concerns, on the other hand, put out formulas that only an expert can follow, and in some cases it would appear that the user must improvise most of the directions. Under such conditions it would appear that any dissatisfaction must be traceable to inadequate instructions.

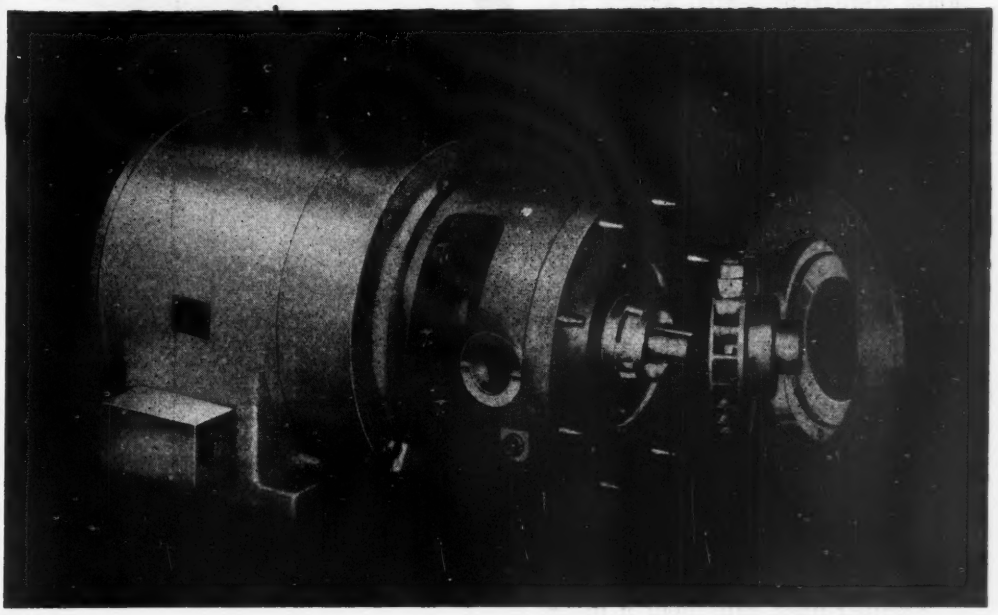
Not only are instructions sometimes inadequate, such as omissions of what to do with certain parts or definition of the correct place to stop an operation but there are occasional errors of omission of temperatures, quantities or working directions. To call for 1 gal. of vinegar, for example, without stating strength and kind, is not very helpful even though it may not lead to disaster.

Deficiencies of the foregoing character are not limited to industrial formulas. They also sometimes appear in household recipes where the manufacturer can be absolutely certain that about 5 percent of his potential customers are brides without any experience whatsoever. Some years ago the production manager of a baking powder company won a wager with the head of the concern that nobody could make a batch of biscuits by exactly following the published recipe (for it had omitted flouring the rollingpin and board). The elderly gentleman attempted it and was soon hopelessly in trouble.

To test the adequacy of any formula, whether industrial or household, it should be put into the hands of an intelligent novice for a trial. If he fails to produce what is intended then the formula probably has defects. And a defective formula is not, to our way of thinking, a useful piece of sales promotion.



ONLY CLEAN AIR CAN REACH YOUR PRODUCT FROM A NASH COMPRESSOR



Here is a compressor designed perfectly to meet the needs of the Food Plants. It is simple, for it has only one moving part, a rotor cast in one piece and rotating in the casing without metallic contact. This means trouble-free operation over long periods. It is compact and requires little valuable floor space. Its oversize ball bearings seldom require attention or lubrication. No lubrication is required in the interior, so that the air is kept clean from the time it enters the pump. • But this is not all. The compressing medium in the Nash Pump is a rotating column of clean water. The air is in intimate contact with this water in passing thru the pump and is actually scrubbed while it is being compressed. Dust present in the atmosphere is removed, and the air delivered free from dirt, oil, or heat, without the use of scrubbers or air washers. Think what this means in terms of purchase cost and floor space occupied by complicated air washing apparatus. • These pumps are proving their worth in the most trying service. They are ideal for transferring beer or wort from tank to tank by air pressure, for maintaining pressure on aging tanks, for supplying compressed air to bottling machines in racking, etc. • Available in any capacity, these pumps deliver pressures up to 40 lbs. absolutely uniform without storage tanks. • You want the most reliable pumping equipment in your plant, so by all means find out more about the Hytor. Our catalog No. 217 is free on request.

THE NASH ENGINEERING COMPANY

243 WILSON ROAD • SOUTH NORWALK, CONNECTICUT

NEW PACKAGES & PRODUCTS

Quick Coffee

WHEN soluble coffees were released for civilian markets, both tins and glass were represented among the packages. We showed a typical Army tin last September.

The Borden Co., New York, has selected a 2½ oz. pack in glass for its Instantly Prepared Coffee. At a level teaspoonful to a cup this should mean 35 to 44 cups from one small jar.

The all-around label is in maroon with white reverse printing. Panels in a tint of the same color carry directions for preparation. The metal screw cap uses the tint as background, with darker lettering.

Tree-Fresh

AMONG the army-released group is Purest Brand Condensed Pure Frozen Orange Juice, packed by Knight & Middleton, Inc., Clearwater, Fla.

Lacquer-lined cans hold 6 oz. A temporary label is printed in black on orange. To serve, the condensed juice, which must be stored at temperatures below 18 deg. F., is diluted with 3 times its volume of cool water and is then of equal strength to fresh squeezed juice.

Coffee Blocks

ANOTHER of the hitherto Army-only packages to get into general circulation lately is compressed coffee blocks. Maguire Industries, New York prepares these by pressing while under vacuum and at very low temperature. The compressed blocks, 1¾ in. square and ½ in. thick, are each wrapped in heatsealing cellophane. For Dover Foods, Inc., New York, ten of the blocks are wrapped in a cellophane package with a very simple black and white label laid under the wrap at one end.

Since the coffee in these is fresh roasted and ground, it is to be brewed in the regular way. Each block makes about 3 cups, depending on the strength desired.

Summer Soup

SOUPLETS MADRILENE, for jellied soups or aspics, is a coarse pinkish powder containing hydrolyzed vegetable protein, gelatine, salt, meat extract, sugar, dehydrated onion, lactic and citric acids, spices and U. S. certified food color. From this, jellied soup is prepared the same way as gelatine desserts, by adding boiling water and then chilling for several hours.

The small straight-sided jar holds 1½ oz. net, enough for 8 cups. The all-around label is banded in red and white, with yellow lettering. The metal screw cap is lacquered gold.

American Dietaids Co., Inc., Yonkers, N. Y., has recently introduced this one.

For Baby

CAMPBELL SOUP CO., Camden, N. J., has entered the baby soup field. Five flavors of strained soup are on test in the Philadelphia area.

Ready to warm and serve, the soups have a rich dark amber color and good body. The formulas provide variety. Carrots, white potatoes, onions and celery are used in all. Sweet potatoes, tomatoes and peas add flavor where they are desirable. Either oatmeal, barley

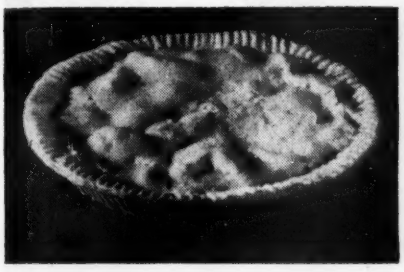
or egg noodles thicken the soups. The vegetable soup contains okra. The meat flavors are liver, beef, lamb and chicken.

Glass jars hold 4¾ oz. and bear the familiar red and white labels.

Here are the Pies

IN the few stores that carry them, frozen pies are an old story, but to the rest of the country they are in the list of things to come. So we are showing this month a frozen pie as it is sold by the Frozen Food Center, White Plains, N. Y.

Prepared by a commercial baker, to specification, then frozen by a nearby commercial freezer, the pies are transported to the stores in ventilated galvanized carrying racks and held in low temperature units until sold. There is only the simplest of packaging. The pie is on a fiber plate. Loose parchment is placed in an undecorated chipboard set-up box, the pie is set on this, another sheet is put over it and the cover slipped in place. Quick distribution has made more elaborate packaging unnecessary, and apparently the pies do not suffer from freezer dehydration.



Pies can be placed in the oven in the frozen state. Apple, peach, plum, cherry and mince have been offered, so far.

For Cake Makers

READY for the batter, a 1¼ lb. jar of Helen Ann Holly-Day Fruit Cake Mix contains glace fruits, citron, both dark and white raisins, citrus peels, finely chopped nuts, sugar, pectin, spices, flavoring, sherry wine and brandy. Benzoate of soda, 1/10 of 1 percent, is added. The pieces are of various sizes, avoiding a uniform machine-cut look, and the blending of flavors in the jar should be an advantage in the cake. The quantity is sufficient to add to 1-lb. of pound cake batter.

Chas. P. Wagner & Bro., of New Orleans, La., makes the mixture, which is packed in a wide mouth jar with metal screw cap. The package bears evidence of present material stringencies. As offered on the New York market the label is printed in red and green with a holly border, the cap in red and two shades of blue.

Flavor and Spice

VERSATILITY and convenience are emphasized for the Tomato Mix now being marketed by Sardik Food Products Corp., New York.

This product, containing dehydrated tomato, starch, molasses, powdered onion, celery and seasonings, is already in a postwar package. About ½ oz. of the bright red powder is sealed in an aluminum foil packet, with a heat sealing lining film, printed on the outside with an allover pattern in red tomatoes.

Six packets are included in a green and white folding box also decorated with big red tomatoes. The total content is 2¾ oz.

To make more sure of a favorable reception, through proper use, Sardik puts a recipe booklet in the package. Suggested uses include stews, meat loaves, casseroles, braised meats, as a garnish for salads and in various sauces. The seasonings and starch make preparation of the sauces particularly easy.

'Tater Cakes

POTATO PANCAKES are another of the products now utilizing dehydrated materials. Tater Pancake Mix contains only dehydrated potatoes and onions, with seasoning. The cook must add one egg beaten with 1½ cup of water to one 4-oz. envelope of the mix and allow it to rehydrate 5 minutes, before frying.

Two glassine envelopes, each holding 4 oz., are enclosed in a box. The label is printed in red and green, on a white ground.

Fine Products Co., New York, is the manufacturer.

No More $TONE$ in Your Bottle-Neck!

• Now, with critical war shortage of labor, streamline STONING in your mill. Removing stones has always been slow, laborious and costly out of proportion to other steps in processing cereals, soy beans, and other dry foods. To eliminate this great headache of the cereal and other dry food processors, we have developed a new type stoner—revolutionary in design, amazing in efficiency, low in first cost, in operation. Removes stones, glass, non-magnetic metals, and all other hard, dangerous contaminations from cereals, soybeans, and other beans, and other food products with, 1) an action so sensitive the tiniest particles are easily removed; and 2) operating cost so low it is relatively insignificant; and 3) 99.9% efficiency. Capacity up to 16 tons per hour.

Write for Bulletin FI-745

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Spotting Trails

OVER STRANGE TERRAIN

VISIBLE BY NIGHT, invisible by day—that's a must for the land buoys planted to guide our armed forces at night through unknown country.

Markers coated with Vita-Var Phosphorescent Paint, manufactured by Vita-Var Corporation, Paint Engineers, Newark, N. J., fill the bill.

To assure efficient, economical packaging and complete protection for their product, the makers of Vita-Var use Crown Cans.

★ ★ CROWN CAN ★ ★

INDEPENDENT AND HELPFUL

CROWN CAN COMPANY • NEW YORK • PHILADELPHIA • DIVISION OF CROWN CORK AND SEAL COMPANY, BALTIMORE, MARYLAND

FOOD INDUSTRY NEWS

RAW MATERIALS REVIEW

Food Industry Production Hit By New Low Sugar Allotments

Baker's allotments are cut to 60 percent of base period, for the third quarter, while most others are down to 50 percent

MOST industrial sugar users will be required to operate with 37½ percent less sugar in the third quarter of this year than they used last year. Broadly speaking, this is the result of sugar allocations for the third quarter, which also are expected to permit the largest possible production of canned fruits and vegetables and adjust allotments to population changes.

Sugar allotments by class of industrial user for the quarter beginning July 1, 1945, are as follows:

Sixty percent of base use—Class 1, bread and other bakery products; Class 2, baking mixes, including batters; Class 3, breakfast cereals, cereal paste products, such as spaghetti and macaroni.

Fifty percent of base use—Class 4, ice creams, ices, sherbets, frozen custards and mixes used for these purposes; Class 18, jams, jellies, preserves, marmalades and fruit butters.

Class 5, condensed milk in containers of one gallon or less; cheese; other dairy products not included in other items; frozen eggs; and sugared egg yolks; Class 6, bottled beverages (alcoholic and non-alcoholic), flavoring and coloring extracts, fountain sirups, drink mixes, brandied fruits, maraschino cherries, fountain fruits, pickled fruits and vegetables, relishes.

Class 7, mayonnaise and salad dressing; Class 8, products fried in fat (except bakery products) such as nuts, potato chips; Class 9, cough drops, candy, chocolate, cocoa, chewing gum; Class 10, sandwiches; Class 11, dehydrated and dried soup and soup mixes; Class 12, canned and bottled foods (not included in other items), table syrup; Class 13, experimental, educational demonstration and testing purposes; Class 16, all other classes (food); Class 17, all other classes (non-food) except Classes 14 and 15.

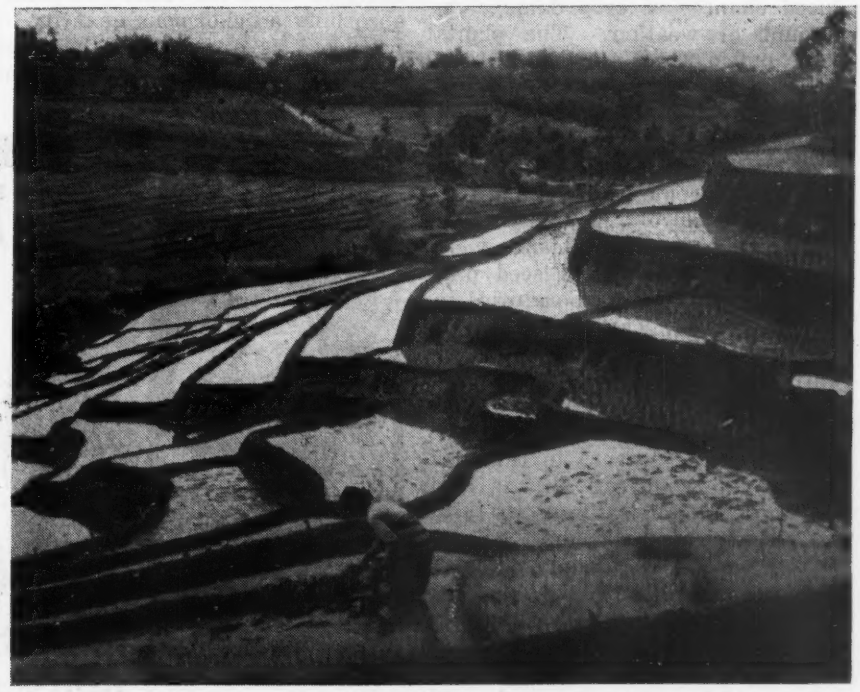
One hundred and ten percent of base use—Class 14, pharmaceuticals (internal), allergy foods, vitamin oils; Class 15, pharmaceuticals (external).

Sugar allowances for commercial canners are about 20 percent below the 1944 rate of use. This means that less sugar will be used per unit, but, as before, there is no restriction on the number of units the processor may pack. The actual reduction of sugar for canning operations varies from item to item, some being greater and some less than the 20 percent average.

Producers of frozen foods will have their use of sugar cut from 20 to 40 percent. Examples given by OPA show that the last year allowance for bulk freezing was 5 lb. of sugar for 15 lb. of apricots but only 3 lb. of sugar for 15 lb. of apricots is allowed this year. For frozen cherries, last year's allowance was 5 lb. of sugar for 20 lb. of cherries. The allowance this year is 4 lb. of sugar for 20 lb. of fruit.

Results Widespread

The industry's leaders have already pointed out the widespread effects of such drastic industrial sugar cuts on the nutritional program of the nation. The ample grain crop, for instance, cannot be fully utilized by the bakers under the new allocations, as they had already been producing close to 50 percent more baked goods on only 80 percent of their base period sugar allotment. The same limitations are imposed upon producers of dairy products, particularly ice cream, for the utilization of milk. The percentage of sugar used by these producers in 1941 amounted to only a small portion of the total sugar used: Baked goods used 9.2 percent, soft drinks 3.9, dairy products 3.2, and chocolate and cacao products 2.3 percent. Canners and preservers, in 1941, used 5.3 percent. There is some question, therefore, of the wisdom of risking heavy cuts in food production to save what amounts to a relatively small amount of sugar.



RICE PLANTING IN JAVA

Here is a picturesque view of one of the principle industries of the Dutch East Indies. The woman is busily engaged in transplanting young rice plants from the seedbed to the terraces. The bamboo trees in the background give a characteristic touch to the scene.

CITRUS COMPETITION

Palestine is slowly emerging as a growing area for oranges as the settlers transform the barren, sandy wasteland into productive soil. The orange industry has already been developed to a point where the present export amounts to 3,000,000 boxes a year. Jewish pioneers are here seen sorting and grading the oranges according to size and quality.

Heinz Airships Plants In Tomato Experiment

AN experiment in air transportation, conducted in May, by the H. J. Heinz Co., is being watched closely by plant growers and food processors as a possible postwar trend. An airplane brought two loads of 165,500 Georgia-grown tomato plants each to Bowling Green, O., in four hours. On the following day, in each case, the plants were planted in Wood County fields.

A. C. Young, Pittsburgh, purchasing agent for Heinz, explained that the experiment provided an earlier planting date, reduced cost of plants to the farmers, and reduced chances of crop damage on account of weather. The plants were pulled from the soil in the morning and placed on the plane, and were in the Ohio soil within 24 hours, Mr. Young pointed out. The plants would take two and a half days to come from Tipton, Ga., by railway express, he said.

The Georgia-grown plants were from selected pedigreed seed produced by the Heinz laboratories in Bowling Green. They were sown in an open field and permitted to grow until 8 in. high. They were fully developed and ready for immediate planting, thus solving the problem of bad setting seasons in this section of the country. This is also the most economical way to raise the tomato plants, he said.

Compared with the present system, the savings are obvious, Mr. Young declared. Seed is planted in northwestern Ohio in hotbeds in early spring. It is later transplanted to outdoor growing beds and must be supervised very closely because of possible cold weather while in the open beds. The plants must be seasoned to the weather for another eight days after the glass has been removed from the beds before the stems are strong enough for planting in the fields. The transplanting from Georgia eliminates all this, Mr. Young explained.

Shortages Will Affect Macaroni Production

SHORTAGE of durum wheat and semolina may cause macaroni manufacturers to change their formulas. The shortage of durum wheat is acute, with the production figures for the last few years showing a gradual decline while the production of macaroni has increased sharply. With the American public absorbing an enormous quantity of macaroni as a result of the meat shortage, the demand for macaroni is expected to remain abnormally high for some time.

Production figures reported by the industry to the War Food Administration range from 577,614,108 lb. of macaroni in 1937, to 819,918,070 lb. in 1944. Top production was reached in 1943, when 982,540,455 lb. were manufactured. Estimates place the rate of macaroni production in the first quarter of 1945 at more than 1,000,000,000 lb. per year.

Government figures on durum wheat production dropped from a high of 44,700,000 bu. in 1942 to 32,900,000 in 1944, and an estimated 30,000,000 bu. in 1945.

The shortage in durum flour has reached a deficit of 26,000,000 lb. Efforts of both the Army and WFA, during the past three months, to secure adequate supplies have failed. A 3 cent price boost did not bring out the required quantity as hoped when the action was taken.

There is no reason to fear a macaroni shortage. Under the standards now in force, there is wide latitude possible in the formula. Paragraph 16.1 of the standards reads in part:

"Macaroni products are the class of food each of which is prepared by drying formed units of dough made from semolina, durum flour, farina, flour, or any combination of two or more of these. . . ."

Where semolina and durum are mentioned on the labels, changes in formula may require new labels to avoid violation of the Food and Drug regulations.

PLENTY OF MEAT, NO POINTS

We may not care for Argentina's alleged oversupply of Nazi influence, but its amplitude of meat is another thing. One of the scarcest items in the world, meat is one of the Argentine's most plentiful products. There is a shortage for export, however, because of strikes in packing plants, the increased foreign demand and a severe drought that reduced livestock.

An Announcement Regarding

CYCLOTHERM STEAM GENERATORS

Cyclotherm Corporation announces its appointment as of June 1, 1945, as the exclusive manufacturer of Cyclotherm units.

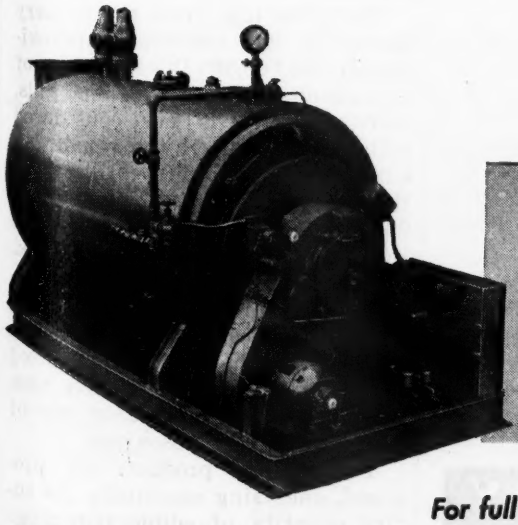
Cyclotherm units alone embody Cyclotherm's unique and patented principles:

- CYCLOTHERM Steam Generators, in sizes ranging from 10 HP to 200 HP, with operating pressures from 15 psi to 200 psi.
- CYCLOTHERM Hot Water Generators.

All units are fully automatic, self-contained, oil or gas fired. Units with combination burners, firing either oil or gas, are also available.

Among Cyclotherm units, manufactured under the designs and patents of General Furnaces Corporation, thousands are in service in vessels of the Navy and Maritime Commission—at Advance Naval Bases—in Army Hospitals and Advance Dressing Stations—in stationary and mobile laundries of the Army, Navy and Marine Corps.

Other Cyclotherms are efficiently and economically furnishing steam to industry throughout the United States and in other countries.

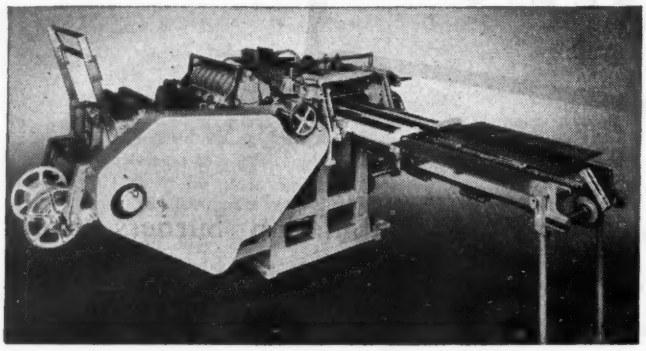


CYCLOTHERM STEAM GENERATOR

For full information and prices write

CYCLOTHERM CORPORATION • 90 BROAD STREET, NEW YORK 4, N. Y.

It won't say "NO" to NEW ideas in packaging



Too often the use of a good merchandising idea is held up or abandoned because the packaging machinery cannot be adapted to handle it . . . This is something to guard against in planning for postwar selling.

Here's what happens right along. One company decides to market its product in a larger or smaller size . . . Another adds an entirely new product to the line . . . A third improves the appearance of its package by using a different wrapping material . . . A fourth decides to get out a special combination offer of two products in one wrap . . . Another would like to market its goods in an open boat with a transparent wrap to display the goods.

Now, in all these cases it would formerly have been necessary to buy new wrapping machines. But today our modern machines can be easily adapted to new requirements—usually by simple adjustments and the substitution of a few parts.

Such versatility is an important ally of sales. And it protects your investment against that sly enemy, obsolescence. When you modernize, do it with an eye on future needs as well as present savings. *Look for flexibility.*

Our line comprises over 80 different types of wrapping machines, suited to a wide variety of products. Let our nearest office give you complete information regarding machines for your type of package.

PACKAGE MACHINERY COMPANY
Springfield 7, Massachusetts
30 Church St., New York 7 • 111 W. Washington St., Chicago 2
101 W. Prospect Ave., Cleveland 15 • 443 S. San Pedro St., Los Angeles 13
32 Front St., W., Toronto 1

PACKAGE MACHINERY COMPANY
Over a Quarter Billion Packages per day are wrapped on our Machines

Two New Bush Limas Interest Industry

MANY commercial seedsmen and lima bean growers, canners and freezers will be interested in two new bush lima bean varieties that are being tested at 22 locations in 1945 by experiment station workers. Both lines also are being increased in California with a view to further test and eventual release if judged worthy of introduction.

They are known at present as 243 and 343, are of particular interest to canners and freezers, and, in addition to Beltsville, Md., may be seen in the trial plots of investigators at the following experiment stations:

Arkansas Agri. Expt. Station, Colorado Potato Expt. Station, Univ. of Conn., Conn. Agri. Expt. Station, Florida Everglades Expt. Station, Ga. Expt. Station, Purdue Univ., U. S. Hort. Field Station, Miss., Univ. of Missouri, Nebraska Agri. Expt. Station, N. J. Agri. Expt. Station, N. Y. State Agri. Expt. Station, N. Y. Agri. Expt. Station, Long Island Veg. Research Farm, University of North Carolina, Ohio Agri. Expt. Station, Oregon Agri. Expt. Station, Penn. Agri. Expt. Station, S. C. Regional Vegetable Breeding Laboratory, Texas Agri. Expt. Station, Utah Agri. Expt. Station, Virginia Truck Expt. Station, Wash. Irrigation Branch Expt. Station.

Limited quantities of 243 for further test are being increased by the McCrea Seed Co., Santa Barbara, Calif., and by F. H. Woodruff and Sons, Inc., Sacramento, Calif. Associated Seed Growers, Inc., San Jose, Calif., is increasing a small lot of 343 under the same arrangement.

Salmon Discards Tried For New Food Products

PRODUCTION of canned food from edible material now being discarded by salmon canneries has been studied by the staff of the Ketchikan fish products laboratory of the United States Fish and Wildlife Service.

The trimmings from the cannery operations will amount to approximately 175,000,000 lb. A portion of this amount consisting of fins, gills, stomachs, etc., is not considered edible. However, if the remaining edible portions were utilized to their fullest extent, at least 125,000,000 lb. of nutritious foodstuffs would be added to the salmon pack.

Obviously, this theoretical production figure is impossible to attain in practice. However, if only a small part of the whole were utilized in 1944, progress would have been made toward more efficient use of the nation's food resources.

Two canned products are proposed, one using essentially the entire quantity of edible trimmings and the second including approxi-

QUICK QUIZ:

Are you in a fog about the future?

Is it a question of:

Rendering an appreciated and profitable out-of-season service by converting part of your refrigerated space to store seasonal surpluses?

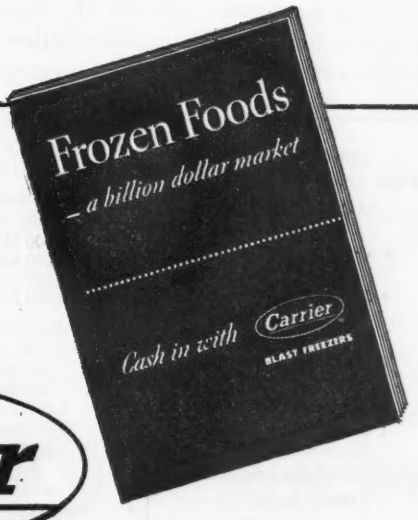
Utilizing your freezing facilities to a greater number of hours for a more profitable operation of your plant?

Cashing in of your familiarity with low-temperature equipment, your reputation for cleanliness and pure products, and your delivery system by providing your customers with frozen foods?

Freezing, Spring and Fall harvests, bracketing mid-summer peaks of your refrigerating plant?

EASY ANSWER:

BE ASSURED that the most effective, most efficient post-war air conditioning and refrigeration equipment will come from Carrier. Carrier knows the particular needs of the food industries through experience. Let this combination of the most advanced equipment and proved "know how" solve your problems with lasting satisfaction. Tell us NOW about your present or post-war plans for air conditioning, refrigeration and unit heating ... A valuable booklet on Frozen Foods FREE! Write today. Carrier Corporation, Syracuse, N.Y.



Carrier

AIR CONDITIONING • REFRIGERATION • INDUSTRIAL HEATING

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CHEMICAL COMPANY, INC.

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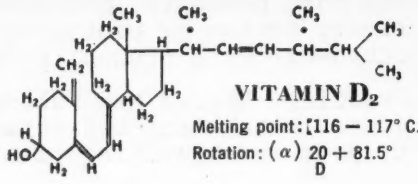
PURE SYNTHETIC

Vitamin D_2

★ (CALCIFEROL)



VITAMIN D_2

Melting point: 116 – 117° C.

Rotation: $(\alpha)_D^{20} + 81.5°$

Winthrop's synthetic vitamin D_2 (Calciferol) is free from lumisterol, toxisterol, suprasterol, and other by-products of irradiation. It never varies in antirachitic potency.

OTHER WINTHROP PURE SYNTHETIC VITAMINS:

- **TRIDEE**—Winthrop's Brand of vitamin D_3 in Corn Oil
- **VITAMIN B_1** (Thiamine Hydrochloride)
- **VITAMIN B_2** (Riboflavin)
- **NIACINAMIDE**
- **VITAMIN B_6** (Pyridoxine Hydrochloride)
- **CALCIUM PANTOTHENATE**
- **VITAMIN C** (Ascorbic Acid)
- **d-ISO-ASCORBIC ACID . . .**
- **AMINO-ACIDS:**
  Tryptophane
  Phenylalanine
  Methionine
- **"B-E-T-S"**—Winthrop's Brand of Bread-Enrichment Tablets
- **"VEXTRAM"**—Winthrop's Brand of Flour-Enrichment Mixture

POTENCIES AND PACKINGS:

Crystalline Form in ampules of one, five, and ten grams (40,000,000 U.S.P. units per gram)

Solution in Corn Oil: 1,000,000 U.S.P. Units per gram* packed as follows:

400 Standard Units in one pint
1,000 Standard Units in imperial quart
2,500 Standard Units in 9¼ oz. amber bottle
50,000 Standard Units in 15½ gallon drums S/S

Also Solution in Corn Oil: 200,000 U.S.P. Units per gram packed as follows:

250 Standard Units in 5¼ oz. amber bottle
500 Standard Units in 9¼ oz. amber bottle
3,000 Standard Units in 5 gallon carboy
10,000 Standard Units in 15½ gallon drums S/S

*Standard Unit=1,000,000 U. S. P. Units

WINTHROP

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Special Markets Division
WINTHROP CHEMICAL COMPANY, INC.
170 Varick Street, New York 13, N. Y.
★ Sole Manufacturer under U. S. Patent 1,902,785 granted to Winthrop Chemical Company, Inc.

mately three-fifths of these materials. The names "Cannery Loaf" and "Cannery Tips" have been arbitrarily assigned in order to provide a concise method of reference to them.

Governor Ernest R. Gruening of Alaska said the "loaf" would be produced on an experimental basis this summer and that the War Department had ordered an unlimited amount to be shipped to the South Pacific area.

Edible Meat Products Converted From Tankage

THE United Nations Relief and Rehabilitation Administration has been hard pressed to secure an adequate supply of protein food for relief purposes in Europe. The worldwide shortage of edible fats and oils and proteins has led to the development of two formulas for meat products in which the parts of the animals that normally find their way into tankage in this country are being packed for edible purposes. The new products are Canadian Meat Lunch and Canadian Blood Sausage, formulas for which are as follows:

Canadian Meat Lunch (100 lb.) Boneless Beef, 66 lb.; Boneless Mutton, 5 lb.; Beef Livers, 12 lb.; Beef Kidneys, 5 lb.; Pork Fat, 12 lb.

Canadian Blood Sausage, (100 lb.) Beef Tripe or hog stomachs, 15 lb.; Beef Lungs, 8 lb.; Beef Udders, 2 lb.; Spleen, 2 lb.; Beef Brains, 1 lb.; Beef Blood, 34 lb.; Scalp, Ears, Snoot, etc., 25 lb.; Oatmeal Flour, 9 lb.; Seasoning, 4 lb.

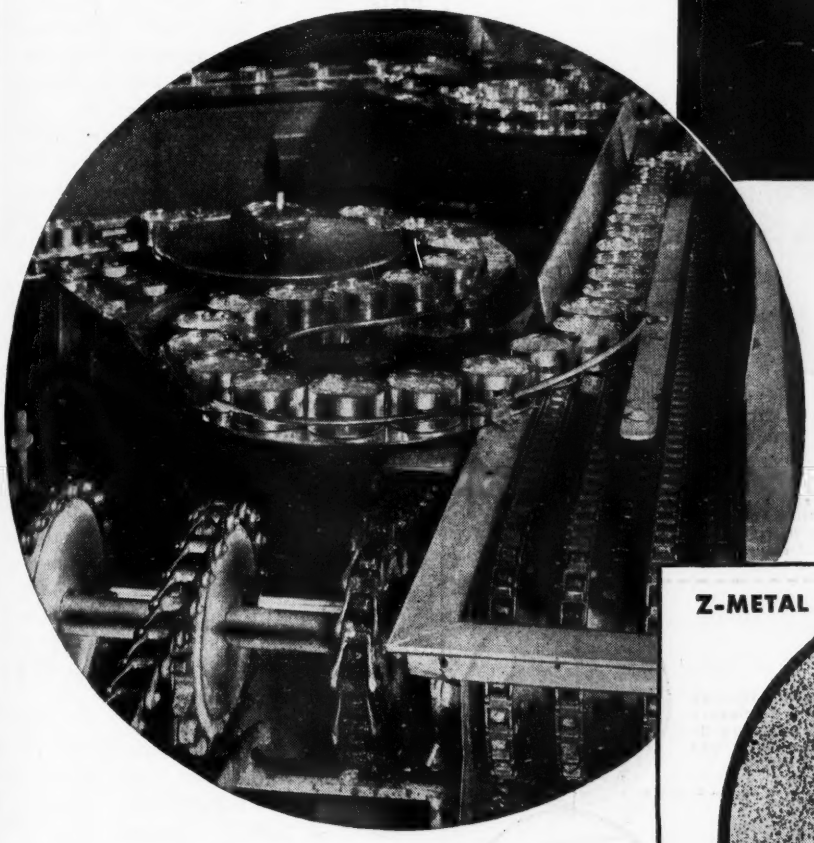
Both products are put up in 12-oz cans. Up to the present time the entire supply has been furnished by Canadian packers. Packers in this country, according to UNRRA officials, are to be given an opportunity to furnish the same material. The request has already been made to the War Food Administration, UNRRA's agent in this country, for the purchase of both products.

Vegetable Oils

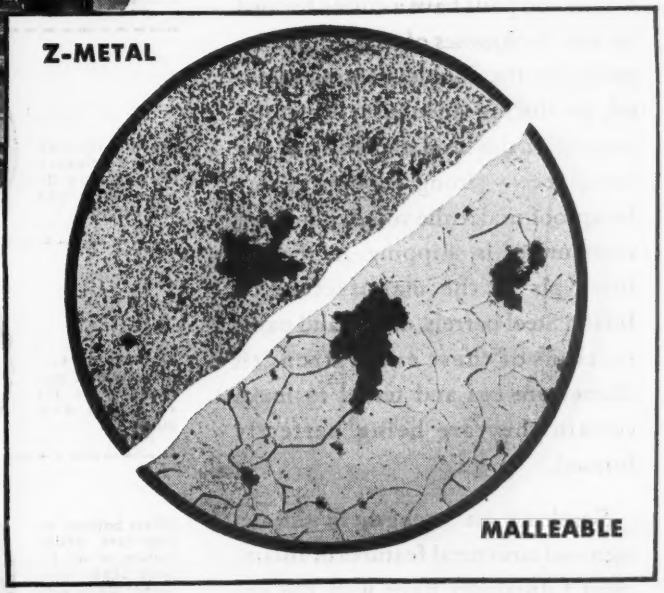
THE suspension of restrictions on the delivery of crude vegetable oil to refiners has been continued by the War Food Administration until the end of September, to facilitate prompt shipment from crushers to refiners. Delivery to other users of crude oils continues to be banned without authorization. Refined vegetable oils remain on strict allocation and their use for industrial purposes is prohibited.

THESE CANS TRAVEL *via* Superhighway

1 TRAFFIC JAMS, delays, interrupted production are unknown on this canning plant conveyor. Just like a modern superhighway system, the cans keep moving smoothly along—never jamming, never hesitating. Know why?



2 THIS CONVEYOR is made of Rex Z-Metal . . . the chain belt that's built to take it . . . to operate efficiently under moist or corrosive conditions. Ordinary chain would quickly corrode and fail if exposed to the corrosive action of fish slime, live steam and the other hazards of fish cannery service. But not Rex Z-Metal. It's a natural for canneries, bottling plants, packing and food processing.



3 THE EXCEPTIONAL QUALITIES of Rex Z-Metal are clearly demonstrated by this Photomicrograph (200 times magnification). It indicates the uniformity of Rex Z-Metal's grain structure. The small spheroidal particles in the Z-Metal are iron carbide. They and their relation to each other impart the greater strength and hardness to Rex Z-Metal. When you require high strength, corrosion and abrasion resisting qualities, get Rex Z-Metal chain belts.

* * *

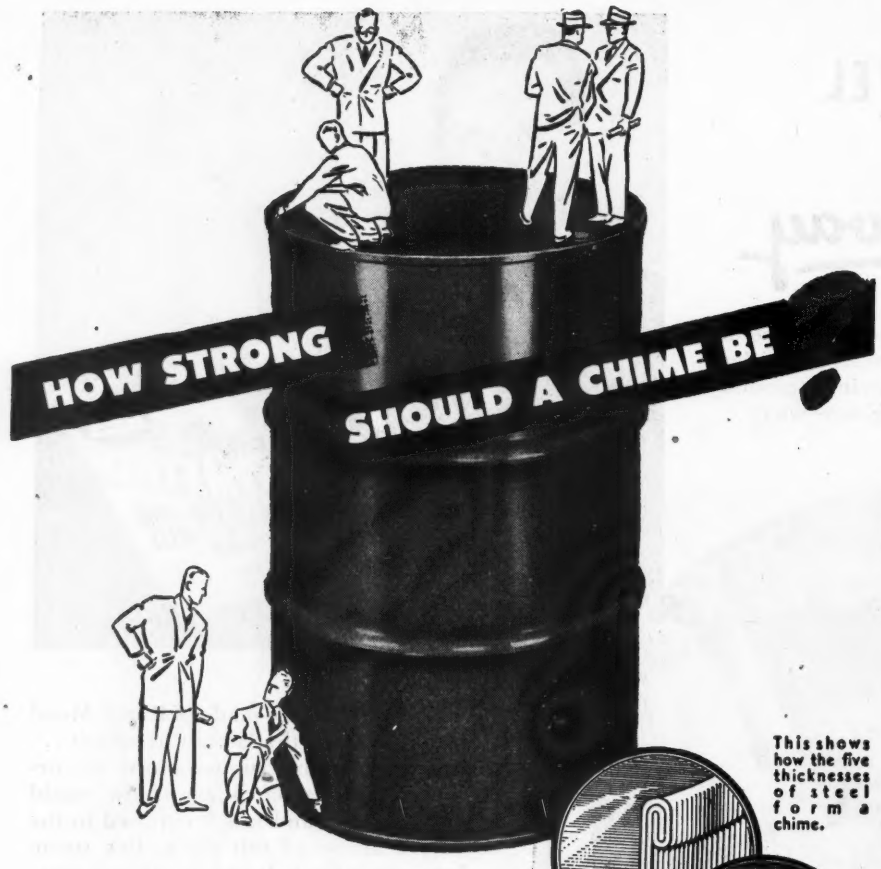
Rex Z-Metal chain belts are the answer to your conveyor problems involving heavy loads or corrosive conditions. The Rex Man can help you with your chain belt application problems. For complete information on Rex Z-Metal Chain Belts, write for your copy of Bulletin No. 437. Chain Belt Company, 1616 West Bruce Street, Milwaukee 4, Wisconsin.

REX **CHAIN BELTS**

Manufactured in every available type for the positive transmission of power, timing of operations and conveying of materials.

CHAIN BELT COMPANY OF MILWAUKEE

Rex Chain Belt and Transmission Division, Rex Conveyor and Process Equipment Division, Milwaukee 4, Wisconsin • Baldwin-Duckworth Division, Springfield 2, Massachusetts



Strength in the chime is a major factor in establishing the strength of the container. Inland Steel barrels, drums and pails have a chime formed by five thicknesses of steel joined together by the double-seaming method, producing an unusually strong joining of the head and body of the container — strong enough to stay leakproof under the rough handling encountered in shipping. At regular intervals in the manufacture of Inland Steel barrels, drums and pails, sections of these extra strength chimes are cut and tested to make certain they are being perfectly formed.

Emphasis on strength in the design and structural features of Inland Steel Containers have won the unqualified preference of America's manufacturers and shippers.

This shows how the five thicknesses of steel form a chime.

These V-shaped rolling hoops do not flatten out or dent easily.

Section through lug type closure that is liquid-proof, airtight and siftproof.

Protection bead on pails adds materially to its strength and utility.

Offset bottom, an important design feature of all Inland Steel Container pails permits containers to be stacked and rolled together.

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Container Specialists

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GENERAL

Food Industry Short On Public Relations

"If the results of food research had been made better known through an educational and informational program directed to government, many of the wartime difficulties of the food industry would have been avoided," declared Joseph W. Hicks, public and industrial relations counsel, Chicago, speaking at the May meeting of the Chicago Section, Institute of Food Technologists. Mr. Hicks referred particularly to the industry's relations with the War Manpower Commission, War Production Board, Office of Defense Transportation and other governmental agencies that pass upon grade labeling, the availability of ingredients and materials for food processing, eligibility of workers in food plants for draft deferments, and proper priorities for equipment and machinery.

If such an informative program had been in effect, the industry-government relations would have been conducive to coordinated efforts toward alleviating the serious consequences of unnecessary food shortages.

Mr. Hicks added that a public relations program based on food technology would certainly include descriptive labeling, as a voluntary practice on the part of food manufacturers and distributors, rather than the compulsory grade-labeling now under controversy.

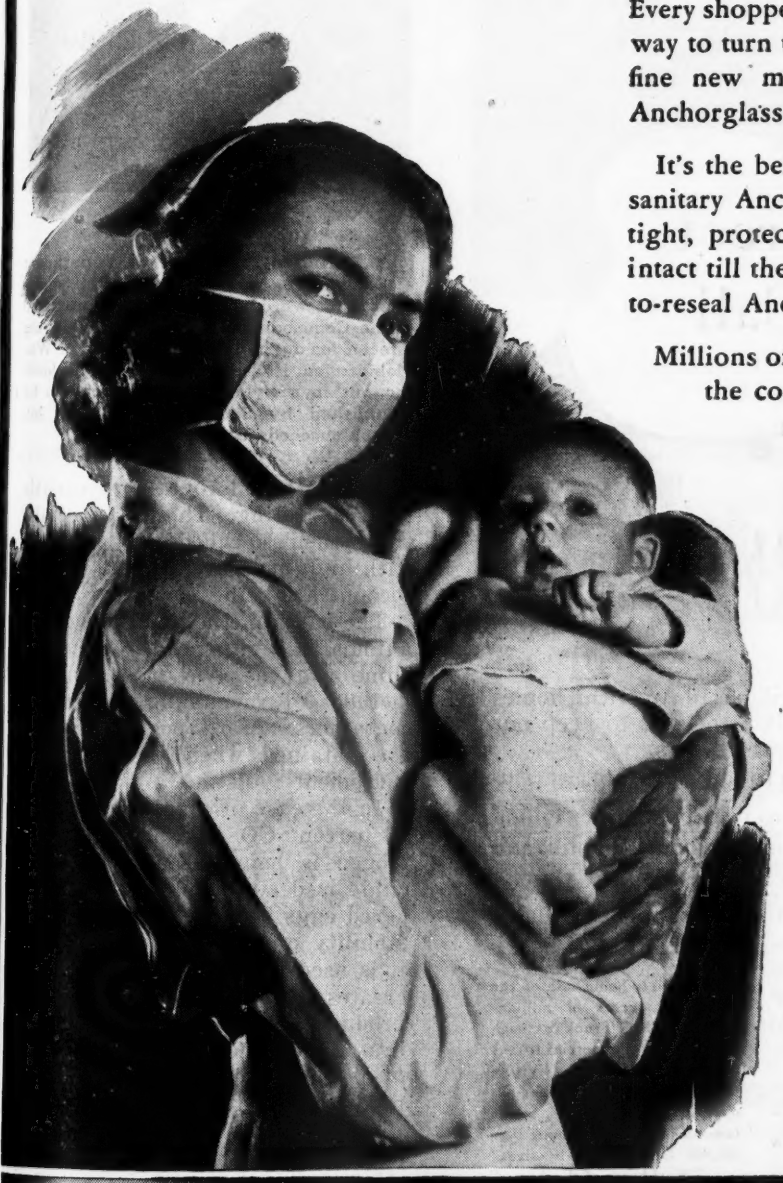
Another responsibility of the food technologist, he said, is to interpret technological data to management, to advertising departments, to public relations departments, sales departments, and even legal departments of the companies employing technologists.

The importance of the solubility of anti-oxidants when utilized to stabilize fats was stressed by H. O. Halvorson, University of Minnesota. He reported that gallates seem to be the most satisfactory of the anti-oxidants tested.

In a discussion of gas-packing as a unit operation by W. J. Mutschler, Continental Can Co. Research Department, low oxygen was shown to be an important factor in inhibiting rancidity in foods. The degree of oxygen to be eliminated depends upon the characteristics of the product and the particular type of pack used. Insects in all stages of development die in an oxygen-free atmosphere. Removal of oxy-

Merchandising Tips-No. 2

The BEST way to introduce a NEW product . . . let people SEE it!



Every shopper is curious about *any new product.* The best way to turn that interest into sales is to let her see your fine new merchandise — in an inviting, crystal clear Anchorglass package!

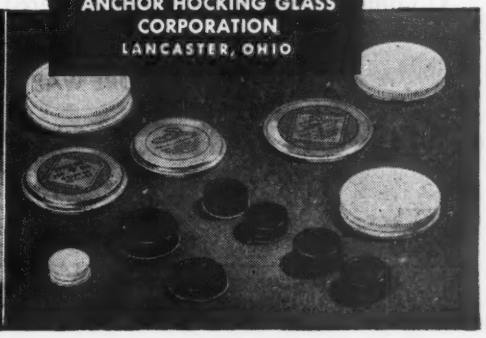
It's the best way to bring her back for more, too. A sanitary Anchorglass container and the leakproof, air-tight, protection of an Anchor Closure keeps quality intact till the last bit is gone. The easy-to-remove, easy-to-reseal Anchor Cap makes every use a pleasure.

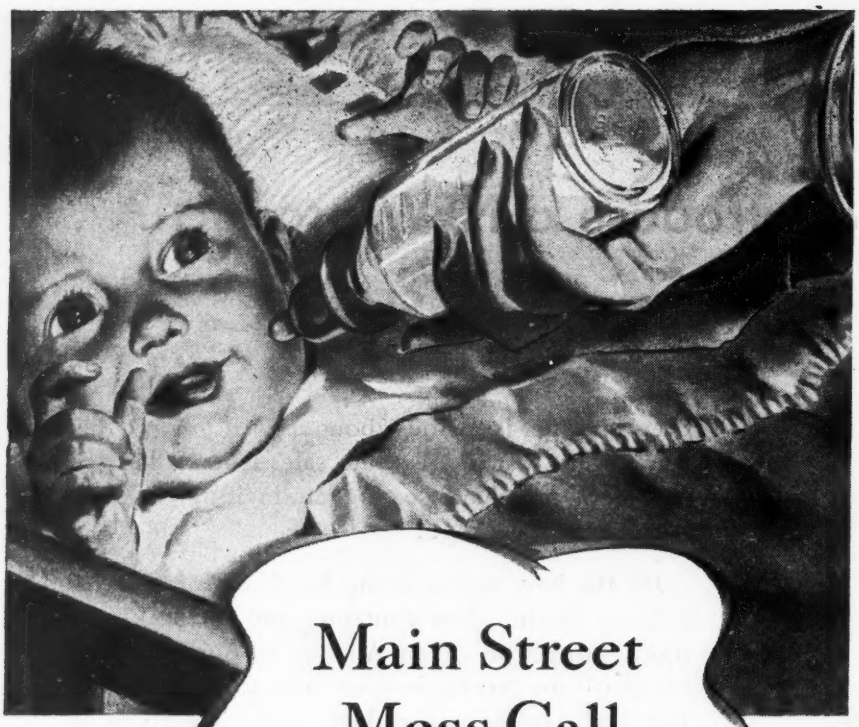
Millions of women prefer the honesty, the protection, the convenience of glass. Let us help you go to market in the right combination of Anchor-glass container and Anchor Cap to win instant approval.

Hear how Anchor Hocking is educating millions of your customers and retailers every week to the advantages of modern glass packaging — "Meet Corliss Archer" every Thursday evening, entire Coast-to-Coast Network, CBS.

Anchor
CONTAINERS and CAPS

PRODUCTS OF
ANCHOR HOCKING GLASS CORPORATION
LANCASTER, OHIO





Main Street Mess Call

HIGHWAY TRANSPORT . . . VITAL TO VICTORY AND THE AMERICAN WAY OF LIFE

A baby's cry is morning mess call in many millions of American homes every day in the year. And plenty of milk is needed to keep our youngsters husky and healthy all their growing years.

Last year, the farmer produced more than 119 billion pounds of milk . . . a remarkable record he's doing his best to beat by another billion pounds this year. Every day, more than 50 million quarts of milk and cream are processed for use on our country's tables.

Farm trucks haul nearly all the feed and other supplies to dairy farms . . . transport most of the milk to creameries and sub-stations. Tank trucks haul the bulk of the milk to urban areas . . . the entire load to 49 of our largest cities. Delivery trucks carry most of the bottled milk directly to retail store and kitchen door.

But for Motor Truck Transportation the *Main Street Mess Call* in most of the nation's 37 million homes would go unanswered.

★ ★ ★ ★ ★ ★ ★ ★

In addition to being one of the largest producers of military vehicles, GMC Truck & Coach builds many commercial trucks for essential users. Civilian GMCs are powered by engines of the same basic design as the famous "270" used in more than 500,000 G M C "six-by-sixes" . . . "Workhorse of the Army."

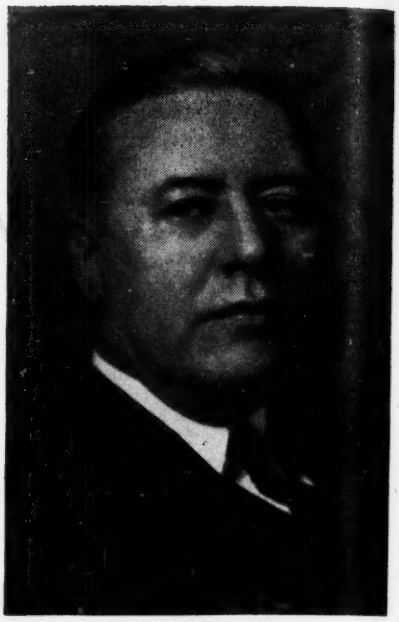
INVEST IN VICTORY . . .
BUY MORE WAR BONDS

GMC TRUCK & COACH DIVISION

General Motors Corporation

Pontiac, Michigan

HOME OF COMMERCIAL GMC TRUCKS AND GM COACHES . . .
VOLUME PRODUCER OF GMC ARMY TRUCKS AND AMPHIBIAN "DUCKS"



BACK IN AGRICULTURE

John B. Hutson returns to the Department of Agriculture, where he spent 24 years, prior to his wartime assignment as president of the Commodity Credit Corp. and deputy director for agriculture in the Office of War Mobilization. He is expected to play a leading role in carrying out the policies to be established by Secretary Anderson. Mr. Hutson succeeds Grover P. Hill.

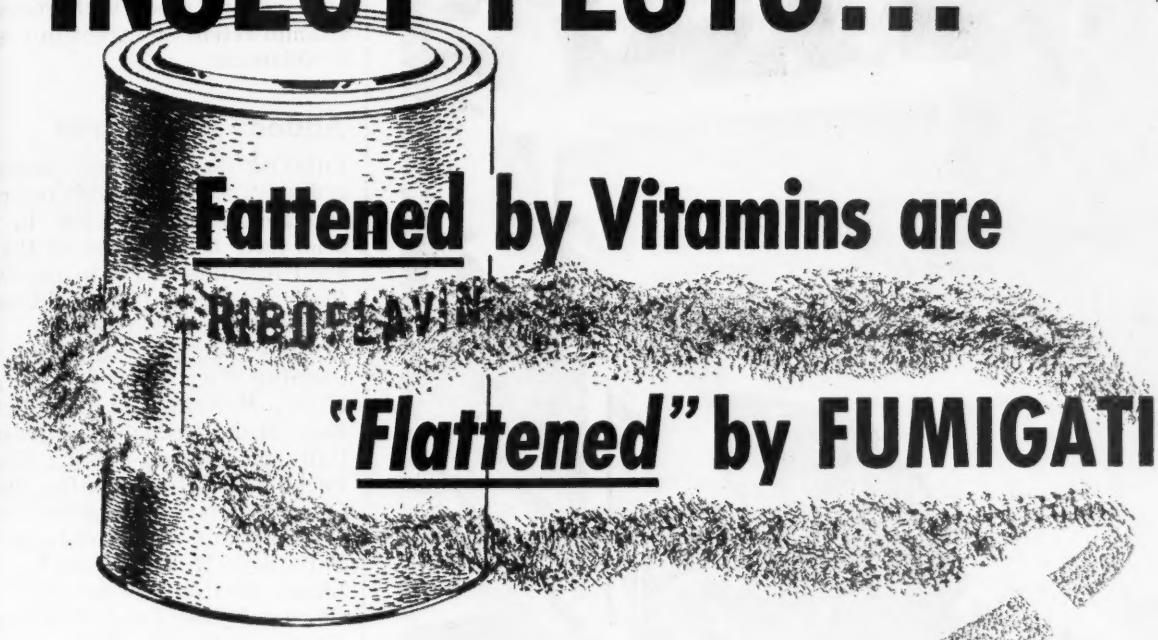
gen from metal containers greatly retards rusting. This is especially true when so-called dry products with high moisture content such as coconut are being packed.

The batch method and use of the automatic high speed rotary machine are the two most common methods of vacuuming and gasing containers. More positive results are obtained when the automatic equipment is used.

In the case of dried egg powder, 20 percent CO_2 and 80 percent nitrogen is being used. Carbon dioxide is desirable in packing powdered eggs because it increases the stability of the product, but when it is used in excessive quantities it creates a flavor change in food products, especially when fats are present. In the particular instance of powdered eggs the use of this mixture is advisable even though the cost of the nitrogen gas cylinders is twice that of CO_2, because the nitrogen has little or no effect upon the product being packed. When nitrogen can be made more economically it will be used almost exclusively for gas-packing.

J. M. Jackson, American Can Co., in his paper on the effect of canning procedures on vitamin retention emphasized that in the production of tomato juice a higher ascorbic acid content is retained if the operation is kept on a continu-

INSECT PESTS...



Fattened by Vitamins are "Flattened" by FUMIGATION

"Pepped up" by today's vitamin enriched foodstuffs, flour beetles and other pests are making themselves more of a problem than ever. As one report put it recently, "... the flour beetle produces many more progeny in enriched flour than in nonenriched flour."

There's only one way to handle the problem, and that's by *fumigation.* Fumigation with Liquid HCN gives you maximum kill at minimum cost ... makes your product even more satisfactory to inspectors and customers. For Liquid HCN kills *all* stages of insect life, from egg to adult. It is harmless to foodstuffs and equipment ... is safe, quick and convenient to use ... is adaptable to all sizes of mills, warehouses, and food processing plants.

Adopt a preventive plan *now!* Assure yourself of a positive, efficient fumigation job by consulting an Industrial Fumigation Engineer. He will be glad to go over your pest control problem with you ... and, if you wish, handle it for you. If you don't happen to know the Industrial Fumigation Engineer in your territory, we'll gladly send you his name. You incur no obligation.

AMERICAN CYANAMID & CHEMICAL CORPORATION

Insecticide Department • *A Unit of American Cyanamid Company*

30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

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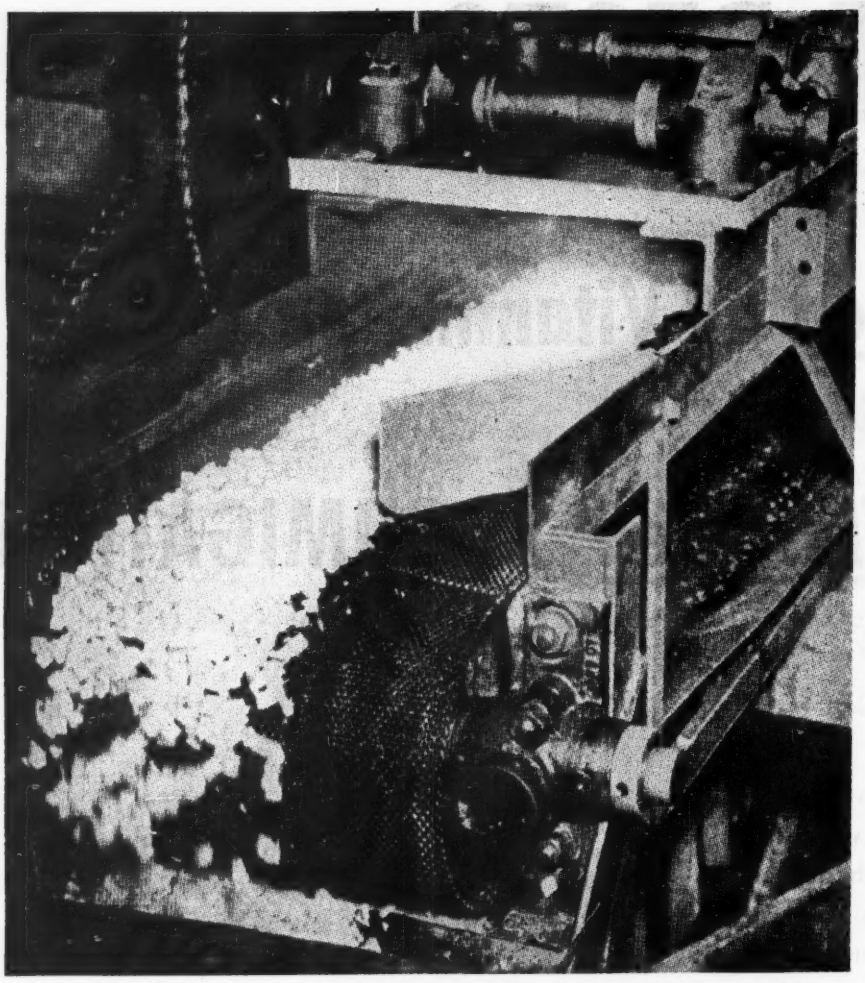
SPECIFY THE FUMIGANT PREFERRED BY EXPERTS

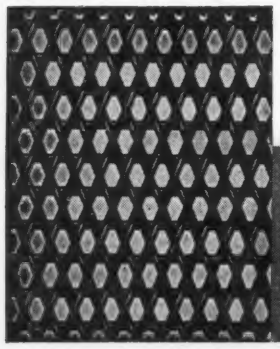
LIQUID HCN



Continuous, Self Unloading, Vegetable Blancher

Your "Ideal" Layout is Now Practical with METALWOVE BELTS

Today it's labor shortage. Tomorrow it may be profit shortage. There's always a reason for wishing you had machinery to do the work of hands. And by replacing your manual handling or batch processing operations with Metalwove Continuous Conveying and Processing Belts, you can make your wish come true. Result: Maximum production with minimum labor. Low Processing unit cost in a competitive market; therefore, more profits. Since all signs point to a continued demand for food way about our pre-war level, it behooves every manufacturer to lay plans as to what he will do, when our government permits him to buy the equipment he needs and wants. . . . Our engineers will gladly recommend the correct type and metal specifications of Metalwove Belt for every place you can use them. Then you can be ready to order the belts, without delay, whenever you are ready. Catalog on request.



AUDUBON
WIRE CLOTH CORPORATION
Subsidiary of Manganese Steel Forge Co.
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Representatives in Most Principal Cities

ous basis. The retention runs from 35 to 78 percent. Thermal processing (retorting) has very little effect upon canned foods with respect to vitamin retention except in the case of thiamine.

Added "A" Awards

THIRTY-THREE more food processing and storage plants, with records of outstanding performance in their field, have been named by the War Food Administration to receive the food and agriculture achievement "A" award. They are:

Alma Canning Co., Alma, Good Canning Co., Fort Smith, Ark.; Libby, McNeill & Libby, Gridley, Sego Milk Products Co. plants at Galt and Salinas, Calif.; Lindner Packing and Provision Co., Denver, Colo.; Jerome Cooperative Creamery Co. plants at Jerome and Twin Falls, Sego Milk Products Co., Buhl, Idaho; Double "O" Sausage Corp., Chicago; Otoe Food Products Co., Hamburg, General Mills, Inc., Special Commodities Division, Keokuk, Iowa; Seymour Packing Co., Topeka, Swift & Co., Kansas City, Kans.; Harrison and Jarboe plants at McDaniel and Sherwood, Md.; Waigle Canning Co., Pigeon, Mich.; General Mills, Inc., Washburn-Crosby Co., Minneapolis; Flour Mills of America, Inc., and Kansas Flour Mills, Inc., North Kansas City, Mo.; Omaha Cold Storage Co. plants at Ainsworth, Central City, Holdredge, Nebraska City, and Ravenna, Neb.; Hills Bros. Coffee, Inc., Edgewater, N. J.; Omaha Cold Storage Co., Winner, S. Dak.; Southwest Poultry Assn., Brownwood, Tex.; Sego Milk Products Co., Richmond, Utah; Washington Co-op Egg & Poultry Assn., Seattle, Wash.; Frigo Brothers, Lena, Western Condensing Co., Vesper, White House Milk Co. plants at Manitowoc and West Bend, Wis.

Wage Incentives

MANY food plants are credited with successful use of wage incentive plans, some of which are described in "A Handbook of Wage Incentive Plans," recently issued by the War Production Board. Reports indicate that flour mills, packing plants, candy manufacturers, and vegetable canners have increased production without increasing costs by the application of the idea. Sixteen guiding principles are enumerated, the most important of which is that real agreement must be reached between management and labor as to the adoption or modification of any

Avoid oil becoming heavier in crankcases ... use

Stanolube HD

Many fleet operators are aware that when crankcases are drained, the oil sometimes seems heavier than when it was installed. That's because under high temperature, heavy duty service some oils "thicken", that is, actually increase in viscosity. An SAE 30 grade oil may increase to an SAE 50 or 60.

Oils that become heavier in service may cause considerable engine trouble such as over-heated engines, ring sticking, and excessive cylinder and bearing wear.

Here is another problem which Stanolube HD can help you solve. In heavy duty service, Stanolube HD will not increase in viscosity as rapidly as conventional oils, and there is only a slight difference in viscosity between new and used Stanolube HD.

Viscosity or body increase in used oil is primarily caused by oil oxidation. Stanolube HD has an effective oxidation inhibitor and detergent additive, which not only reduces oxidation of the oil, but keeps oxidation products from settling in the engine and helps eliminate them when the oil is drained. This also prevents a new fill of oil from becoming contaminated with such oxidation products.

To avoid the excessive maintenance and high cost caused by increased oil viscosity, use Stanolube HD. You can be sure you have the right grade of oil throughout the life of each engine fill. A Standard Oil Automotive Engineer can point out many other cost-saving advantages of Stanolube HD.

Buy more War Bonds

Comparison of Viscosity Increase in various oils

	S.A.E. grade at start of test	S.A.E. grade at end of test
Stanolube HD	S.A.E. 30	S.A.E. 30
Average of 10 approved* oils .	S.A.E. 30	S.A.E. 40
A high grade conventional oil .	S.A.E. 30	S.A.E. 50

*Approved for use by Army Specification 2-104 B

All of the above oils were subjected to the same test—one of the tests required for approval under Army Specification 2-104 B. Stanolube HD showed less viscosity increase than any one of the ten oils tested and considerably less than the average of all.

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

★ FLEET CONSERVATION SERVICE

HOW TO SELECT A FABRICATOR FOR YOUR

CORROSION RESISTANT

PROCESSING EQUIPMENT

When stainless steel and other alloys are subjected to fabricating operations, their valuable properties may be altered or impaired. To be sure that your finished equipment reaches your plant retaining maximum corrosion resistance, select a fabricator with these qualifications:

1 *Look for long experience, definite specialization in working with corrosion resistant alloys.*

•

2 *Be sure that your fabricator has the* special *equipment and trained manpower to work the alloys properly and to* guard *their properties during fabrication.*

•

3 *Make certain that your fabricator employs competent engineers to consult with your staff in evolving the best construction and design for your problem.*

•

We have specialized in fabricating equipment of stainless steel and the corrosion resistant alloys in gauges to ⅜" since these alloys became a factor in industry. We are equipped to build the processing vessels you need for your applications. On your next job, consult with us.

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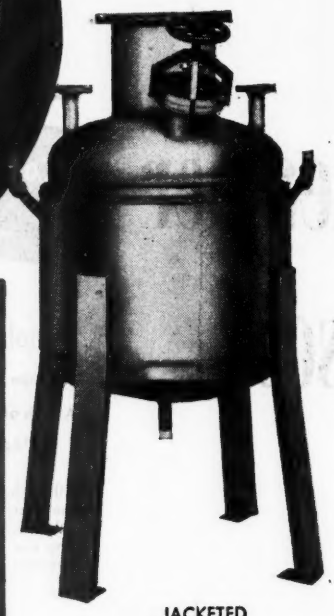


JACKETED KETTLE STILL

Hand hole and column flange. S. Blickman, Inc. builds every type of kettle, jacketed or plain and with or without agitators. Plate No. 7015.

MIXING TANK

Seamless one-piece construction and round corner bottoms insure easy cleaning. Built in a wide variety of sizes and fitted with side- or bottom-entering agitators as required. Plate No. 1296.

S. BLICKMAN, INC.

Guards Alloys in Fabrication

A request on your letterhead will bring our guide, "What to Look For When You Specify Stainless Steel for Your Processing Equipment."

CORROSION RESISTANT PROCESSING EQUIPMENT

TANKS • KETTLES • STILLS • HEAT EXCHANGERS • AGITATORS • MIXERS • TOWERS • PIPING

plan. Copies of the handbook are for sale by the Superintendent of Documents, Washington 25, D. C., at the price of 10 cents per copy.

Food Contracts

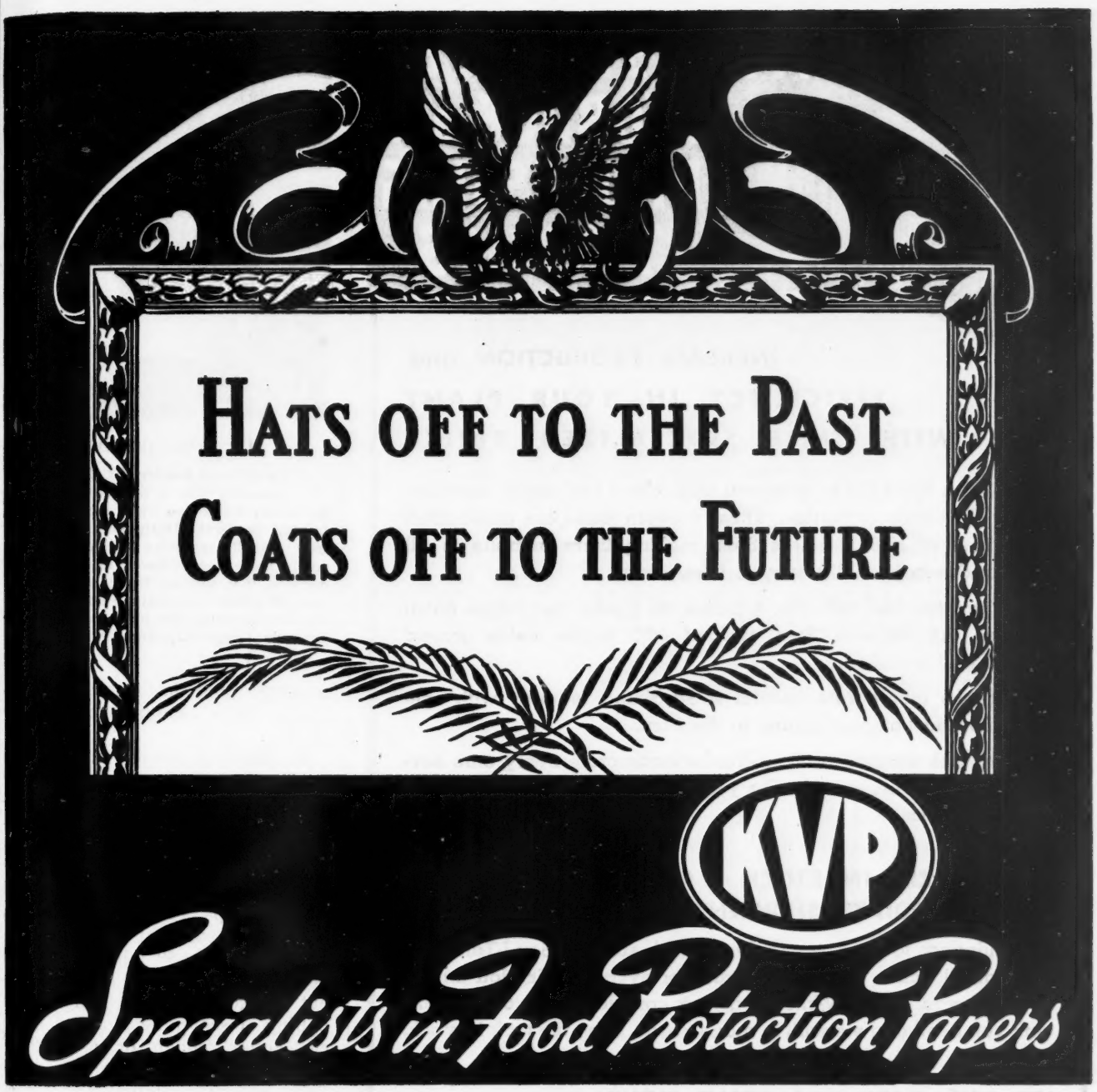
CONTRACTS for food items will be continued in the event of a sudden Japanese surrender, even in the face of an overall 90 percent cutback in Army contracts, according to Material Director Howard Bruce. Food men are of the opinion that food contracts will be the very last to be cut after VJ Day, the cuts depending largely upon the rate of demobilization.

PROCESSING

Candy Men Told About New Ingredient Uses

THE Confectionery Conference, sponsored by the National Confectioners' Association, learned of the potential use of defatted peanut meal, wheat hearts, cottonseed flour, alcohol extracted soya, sunflower seed meal, casein, dehydrated fruits, fruit purees, rice polishings, and fruit juice concentrates in candies at a June meeting in Chicago.

Experimental work done by the U. S. Department of Agriculture on a cooperative project with the NCA, as reported by Dr. H. H. Hall, Southern Regional Research Laboratory, New Orleans, has given promising results with: 1. Low-fat soya in caramels, fudge, and nougat; 2. high-fat soya in fudge; 3. sunflower seed for caramels; 4. defatted peanut flour for fudge, cast creams, and caramel; 5. wheat hearts for cast creams and nougat; 6. cottonseed flour for fudge and fruit roll; 7. starch sponge for chocolate crunches; 8. peach puree in cast creams, and 9. peanut protein in butter brittle and cast creams. A total of 109 different items in 18 series of samples have been judged for quality by the taste-testing committee. Variable amounts of protein, fat, minerals and vitamins were incorporated in a number of the items which show promise for further development. Those of fair or better than average quality were stored at 74 to 80 deg. F. and approximately 55 percent relative humidity to determine their keeping qualities. Examinations for freshness and vitamin retention were made at time of making and after approximately 90 and 180 days of storage. Those not chocolate-dipped generally lost some



FOR THE

MEAT PACKING INDUSTRY

GENUINE VEGETABLE PARCHMENT • WAXED
SPECIAL TREATED • GREASEPROOF

KALAMAZOO VEGETABLE PARCHMENT COMPANY
PARCHMENT • KALAMAZOO 99 • MICHIGAN
BRANCH PLANTS AT HOUSTON, TEXAS AND PHILADELPHIA, PA.

STAINLESS STEEL STORAGE and PROCESSING TANKS

INCREASE PRODUCTION and EFFICIENCY IN YOUR PLANT WITH THESE SPECIALIZED TANKS

Metal-Glass San-I-Tanks give you safe, clean and rapid handling of any chemicals or liquids. These modern tanks are constructed throughout of 18-8 Stainless Steel making them immune to all acids and exceptionally easy to keep clean.

Tanks are finished with No. 4 polish on inside and bright finish outside. All Stainless Steel welded with inside welds ground smooth and polished.

San-I-Tanks incorporate special self-draining features with specially formed bottoms sloping to the front.

Built by tank specialists, San-I-Tanks incorporate every time saving, money saving feature. For years of trouble free service insist on San-I-Tanks.

MANY SIZES IN STOCK — READY FOR IMMEDIATE SHIPMENT

We endeavor to have a supply of stock sizes in San-I-Tanks on hand at all times. We have a tank for every application and in any size you need. Write us giving complete data on the size tank you need and we will, in many cases, have the tank in stock.

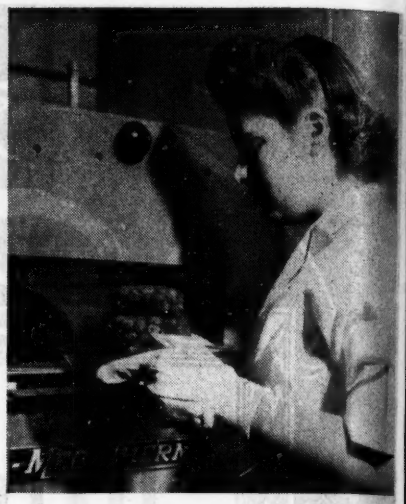
LET OUR ENGINEERS SOLVE YOUR SPECIAL TANK PROBLEMS

In addition to our complete line of stock sizes in San-I-Tanks which are stocked for immediate shipment, we also manufacture special sizes built to your requirements. If you have a special tank problem get in touch with us and our engineers will be glad to give you their suggestions. No obligation of course. It it's a tank problem we can solve it for you. Over 20 years of tank building experience backs the San-I-Tank so play safe and work with a tank specialist.

Write for Complete Literature and Prices

Metal-Glass Products Co.

Dept. FI. Belding, Michigan



ELECTRONIC DEFROSTER

A & P's national bakery division has been experimenting with a dielectric heater for defrosting the frozen fruits that go into its bakery products. Thirty-pound cartons of fruit normally requiring 20 hours to defrost safely have been thawed in less than 15 minutes. It is claimed that there is no loss in quality such as occurs in normal defrosting. Experiments also have been made in defrosting eggs dielectrically.

moisture and hardened. All retained their vitamin content very well.

In making these experimental candies, a deviation from customary candy-making technic was necessary to avoid lumping and scorching when the flour-type of test ingredients was used. By adding these flour-type ingredients to cold sugar sirups, stirring moderately, and letting stand at room temperature for 30 to 60 min., they could be added to the candy batches without any complications. There is no balling or scorching if added to the cast cream fondant or to the "bob" during cooking. In the case of refined peanut proteins, addition of 4.7 and 8.0 percent respectively can be made in cold sirup to cast creams and butter brittle without adverse effect upon the texture of the finished candies. When the added ingredient is alcohol-extracted soya or defatted peanut meal, particularly, precooking of the sirup mixture is necessary to eliminate the raw taste of the ingredient.

This experimental work is part of a program to obtain increased utilization of agricultural products in confectionery manufacture.

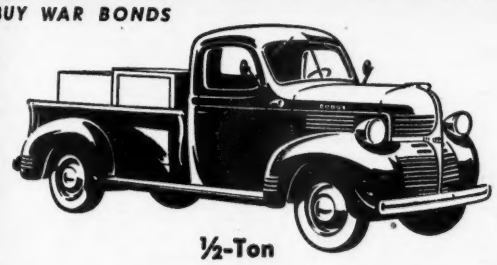
Food Standards

TENTATIVE U. S. standards for grades of dried figs, effective April 16, and for grades of frozen lima beans, effective March 15, were issued recently by WFA. Copies can

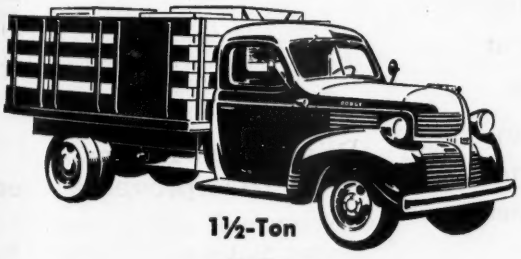
Your Dodge Dealer is now taking orders for NEW

DODGE *Job-Rated* TRUCKS

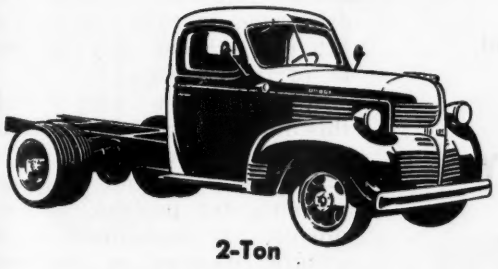
BUY WAR BONDS



½-Ton



1½-Ton



2-Ton

Plenty of Truck "PARTS" Insure Uninterrupted Operation!

Owners will long remember the **continuous** wartime service obtained from their Dodge trucks because of the **availability** of factory-engineered parts. Dodge "parts availability" is a permanent advantage to Dodge truck owners.

To maintain the nation's truck transportation system until Japan has been defeated, the War Production Board has authorized the production of new Dodge *Job-Rated* trucks for civilian use.

In the huge Dodge truck plant in Detroit, both military trucks and trucks needed to sustain essential home-front haulage are being produced in large quantities.

To our Armed Forces go Dodge-built military trucks . . . over 400,000 of which Dodge has built to date.

To Dodge dealers are going the Dodge *Job-Rated* "home-front" trucks . . . rugged, dependable, precision-built trucks of traditional Dodge quality.

Dodge dealers are now taking orders for these trucks. See your Dodge dealer now for a truck that fits *your* hauling job . . . a Dodge *Job-Rated* truck.

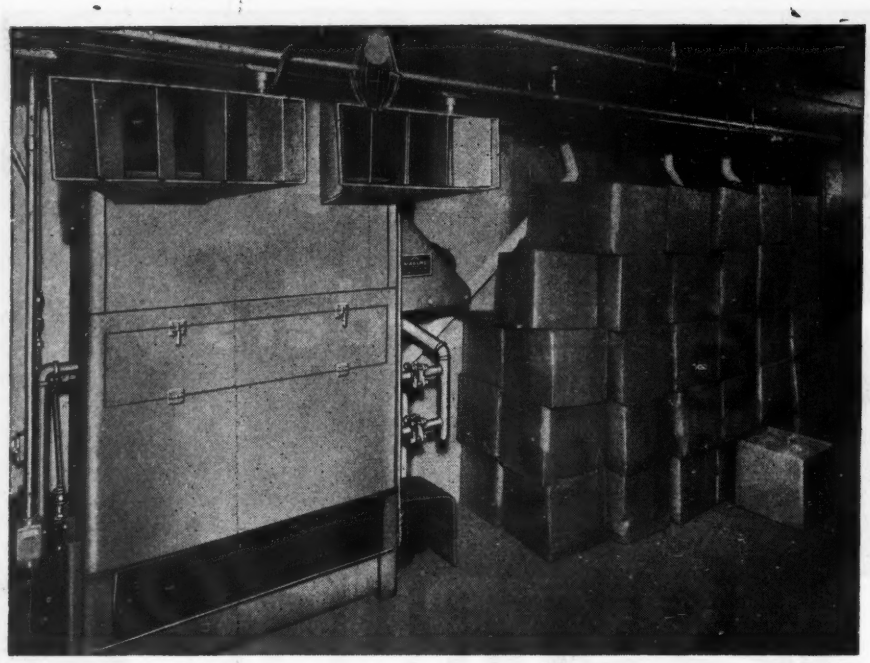
DODGE DIVISION of CHRYSLER CORPORATION

YOU'LL ENJOY "THE MUSIC OF MORTON GOULD," CBS, THURSDAYS, 9 P.M., E.W.T.

DODGE *Job-Rated* TRUCKS

FIT THE JOB . . . LAST LONGER

54,000 U. S. COMMUNITIES DEPEND ENTIRELY ON TRUCKS FOR TRANSPORTATION!



PATENTED

Increasing Plant Capacity with "NIAGARA NO-FROST"

● The Niagara "No-Frost" Method can be a vital factor in plant production. It can also contribute to lower product costs by increasing production effectiveness to offset higher labor costs.

In many different food industries, refrigeration plants that have installed the Niagara "No-Frost" Method have experienced an increase in useful capacity and production. "No-Frost" always secures the benefit of full refrigeration capacity with no losses at any time from the formation of ice on cooling coils.

The Niagara "No-Frost" Method also saves maintenance labor and avoids production stoppages that result from shut-down of refrigeration, caused either by the icing of coils or operational troubles.

For information on the Niagara "No-Frost" Method, write for Bulletins 83 and 95.

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Over 30 Years of Service in Industrial Air Engineering

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Field Engineering Offices in Principal Cities

INDUSTRIAL COOLING HEATING • DRYING

NIAGARA

HUMIDIFYING • AIR ENGINEERING EQUIPMENT

be had from the Standardization and Inspection Division, Fruit and Vegetable Branch, War Food Administration, Washington 25, D. C. A Federal Inspection Stock Catalog, with specifications for raw, boiled and frozen shrimp has also been issued as PP-S-316.

Army Specifications

THE Quartermaster Corps has issued the following specifications. They are listed with the Chicago Quartermaster Depot number and date of issue.

Mustard Mix, C. Q. D. No. 364, Mar. 24, 1945. Gravy and Table Sauce Base, C. Q. D. No. 360, Mar. 27, 1945. Rolled or Flaked Oats, C. Q. D. No. 357, Mar. 13, 1945, Use in lieu of Federal Specification No. N-O-41, Mar. 31, 1931. Packaging and Packing Canned Subsistence Items for Overseas Shipment, C. Q. D. No. 350, Nov. 15, 1944, Amendment-2, Mar. 23, 1945, Superseding Amendment-1, Jan. 13, 1945. Dehydrated Beets, C. Q. D. No. 72 F, Mar. 21, 1945, Superseding C. Q. D. No. 72E, May 8, 1944. Dehydrated Sweet Potatoes, C. Q. D. No. 60F, Feb. 26, 1945, Superseding C. Q. D. No. 60E, May 15, 1944. Dehydrated Carrots, C. Q. D. No. 73D, Mar. 24, 1945, Superseding C. Q. D. No. 73C Sept. 12, 1944. Canned Corned Beef Hash, C. Q. D., No. 149B, Nov. 2, 1943, Amendment-3, Apr. 27, 1945, Superseding Amendment-1, Mar. 6, 1945, and Amendment 2, May 12, 1944. Canned Beans with Pork, C. Q. D. No. 51C, Mar. 27, 1945, Superseding C. Q. D. No. 51B, Mar. 22, 1944. Packing of Shell Eggs for Overseas Shipment, C. Q. D. No. 334A, Apr. 15, 1945, Superseding C. Q. D. No. 334, Oct. 19, 1944. Canned Chili Con Carne, C. Q. D. No. 365, Mar. 27, 1945, Use in lieu of Federal Specification EE-C-281. Canned Cheese Spread, C. Q. D. No. 358, Mar. 13, 1945. Pre-Mixed Cereal With Sugar and Dry Milk, C. Q. D. No. 92, Nov. 24, 1942, Amendment-1, Apr. 9, 1945. Cocoa, C. Q. D. No. 316A, Feb. 23, 1945, Amendment 1, Apr. 5, 1945. Canned Beef Stew, C. Q. D. No. 359, Mar. 14, 1945, To be used in lieu of C. Q. D. No. 8C, July 29, 1944. Dehydrated Cabbage, C. Q. D. No. 58C, Mar. 24, 1945, Superseding C. Q. D. No. 58B, Aug. 21, 1944. Canned Corned Beef, C. Q. D. No. 41A, Mar. 8, 1945, Superseding C. Q. D. No. 41, May 15, 1942. Dehydrated Onions, C. Q. D. No. 70D, Mar. 23, 1945, Superseding C. Q. D. No. 70C, Sept. 11, 1944. Red Cross Food Package, C. Q. D. No. 363, Mar. 26, 1945.

Dried Eggs Proposed To Improve Ice Cream

SIXTEEN milk drying plants in the United States made 7,500,000 lb. of dried eggs in 1941. In 1944 about 120 plants made over 320,000,000 lb. of these products.

Already those who stimulated this huge growth in manufacturing capacity for Lend-Lease and military reasons are now thinking and planning for postwar use of the product. A Department of Agriculture comment on the prospect for using dried eggs in ice cream, was recently made.

"Even though complete information about present total use of dried egg products in ice cream in the U. S. is unavailable," said the department, "there seems to be general agreement that to add dried eggs improves the whipping qualities of the mix, cuts down the time

WHERE *Heat* IS A FACTOR IN YOUR PROCESSING

the job is a natural for Carpenter Stainless Tubing!

In many types of heat exchange equipment, pipe lines and processing equipment this tubing provides the *extra margin of safety* that reduces costs. Each lot of this tubing is 100% hydrostatically tested. Whether you are producing fine chemicals, food products or aviation gasoline, Carpenter Welded Stainless Tubing keeps your equipment on the job longer.

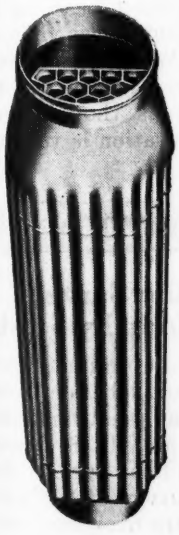
You can depend upon this tubing to stand up under continuous or intermittent attacks by heat, pressure and corrosion.

Ask for the handy file folder of data on Carpenter Welded Stainless Tubing. Find out how this stainless tubing can save you money and processing headaches.

CHECK THE ADVANTAGES OF CARPENTER WELDED STAINLESS TUBING

- High resistance to heat scale
- Types to provide specific corrosion resistance
- Each length 100% hydrostatically tested
- Low first cost, low maintenance cost
- Easy to fabricate and install
- Guards against product contamination

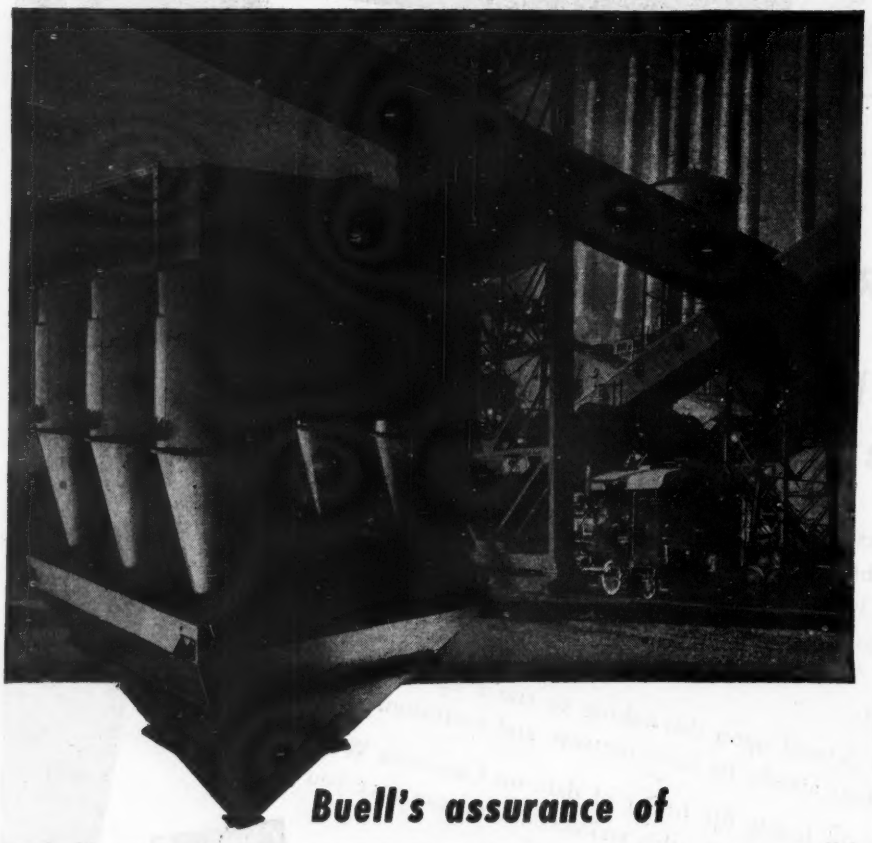
THE CARPENTER STEEL COMPANY
Welded Alloy Tube Division
Kenilworth, New Jersey



This Carpenter Welded Stainless tube bundle for an aircraft heating unit is built to withstand terrific heat and corrosive exhaust gases.

Carpenter
WELDED
STAINLESS TUBING

EXTRA STURDY CONSTRUCTION



Buell's assurance of
HIGH EFFICIENCY, LOW MAINTENANCE, LONG LIFE

BUELL (van Tongeren) Dust Collectors have been in use for five or more years without a failure, without the replacement of a part. Many installations having been in continuous use under the most exacting operating conditions and at high working temperatures.

This recognized ability to withstand wear, heat and vibration is due to Buell's extra-sturdy construction. Fabricated of extra thick steel, completely seal-welded inside and out, with welds ground to a flush smooth surface, Buell bodies and cones are as "tight" as a casting. Buell hoppers, for example, have a reputation for especially rugged construction; braced and stiffened with 3" channels that offer strong resistance to vibration.

Finally, because Buell provides this *needed* ruggedness, Buell (van Tongeren) performance is always dependable.

BUELL FEATURES

SHAVE-OFF
LARGE DIAMETERS
EXTRA-STURDY CONSTRUCTION
CORRECT HOPPER DESIGN
SPLIT-DUCT MANIFOLDS
INNER WELDS GROUND SMOOTH

RESULT IN

HIGH COLLECTION EFFICIENCY
LESS FAN BLADE WEAR
LOW DRAFT LOSS
LOW POWER CONSUMPTION
HIGH TEMPERATURE RESISTANCE
UNLIMITED CAPACITY
NO MOVING PARTS
FREE DUST FLOW

PRODUCE

HIGH EFFICIENCY
LOW MAINTENANCE
LOW OPERATING COST
LONG LIFE
NO CLOGGING

buell
DUST RECOVERY SYSTEMS

Engineers and plant executives will find much of interest in Buell's 32-page book:
"The van Tongeren System of Industrial Dust Recovery"
BUELL ENGINEERING COMPANY, INC.
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Sales Representatives in Principal Cities

DESIGNED TO DO A JOB, NOT JUST TO MEET A "SPEC"

required to obtain the over-run, adds color, increases the food value, smoothness, and stiffness, and makes the ice cream more resistant to melting. Mixes containing 1 and 2 percent of egg solids received good consumer acceptance in taste test panels, but further research is required to determine the most acceptable percentage of egg solids and to discover how to reduce the cost of ice cream in proportion to the increase in cost of additional egg.

"Educational programs are needed to overcome the prejudices that have resulted among users from low-quality powdered egg products, formerly available, and to inform the public of the high-qualiey dried egg products now available.

Asparagus Standards Amended by F&DA

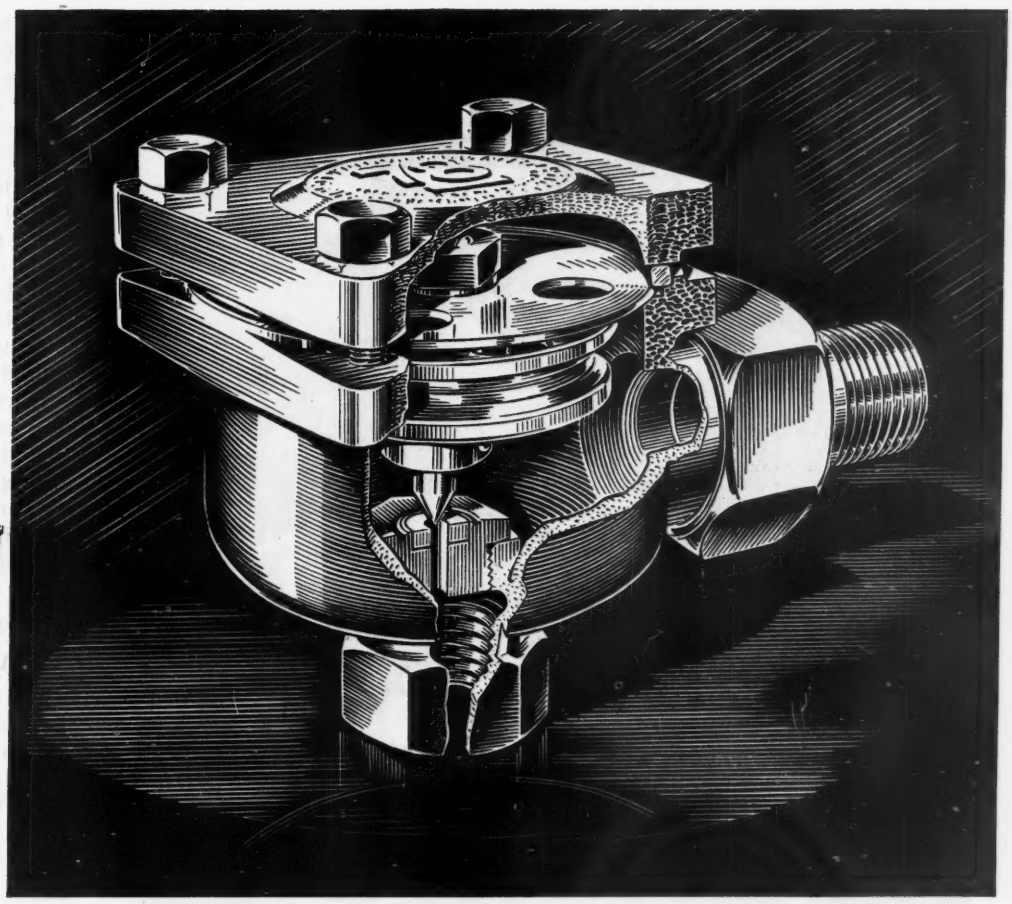
ASPARAGUS may now be canned either in a water medium or in asparagus juice or a mixture of water and juice. The standard of identity fixed by the Food and Drug Administration has been amended to permit this in an action promulgated late in May, which becomes effective the last week in August.

The liquid called asparagus juice is "prepared from asparagus sprouts and pieces of sprouts that are washed, steamed, pressed, and suspended matter removed from the recovered juice." Cans packed in such a medium must bear on the label the statement "packed in asparagus juice." When a mixture of juice and water is used, the medium is treated as though water and no label declaration is required.

DISTRIBUTION

Grade Labeling Survey Being Made by Service

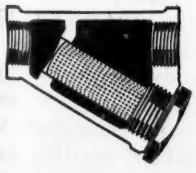
IN an effort to determine exactly what type of grade label on canned fruits and vegetables buyers themselves prefer, if any, U. S. Inspected Foods Educational Service, New York, began a survey of 3,000 consumers the country over, on June 1. Each of the 3,000 will receive a packet containing a representative label from some of the service's member canners and directions to return in the stamped envelope, also enclosed, that label which she considers most helpful in point-of-sale purchasing. Those surveyed are also being asked to make any pertinent comments on the reverse of the label.



"—because the first cost is our last consideration..."

"We just think it is poor economy to pay *high* prices for fine process-steam-using equipment and *high* wages to experienced operators and *high* costs for (rationed) fuel, and then to ham-string the entire operation in order to save a few pennies on the cost of the traps . . ."

You do pay a little more for Webster Series "78" Thermostatic Traps. But you get more—a great deal more. You get prompt, complete and continuous discharge of *both* air and water of condensation. No air binding. No water logging. No loss of "live" steam. No time-loss in heating up . . . You get *full efficiency* in the operation of your equipment—and "full efficiency" means lower costs—and "lower costs" means higher profits.



Webster Dirt Strainers placed ahead of Webster Traps protect the Traps against pipe scale, dirt and sediment. Basket easily removed for cleaning.

Webster Series "78" Thermostatic Traps are not just an adaptation of low pressure design to high pressure duty. They have been designed from the ground up for operation at process pressures—from 15 to 150 lbs. per sq. in. Webster Bulletin B-1200 E gives facts of interest to users of Process Steam. It is yours for the asking. Write for it today.

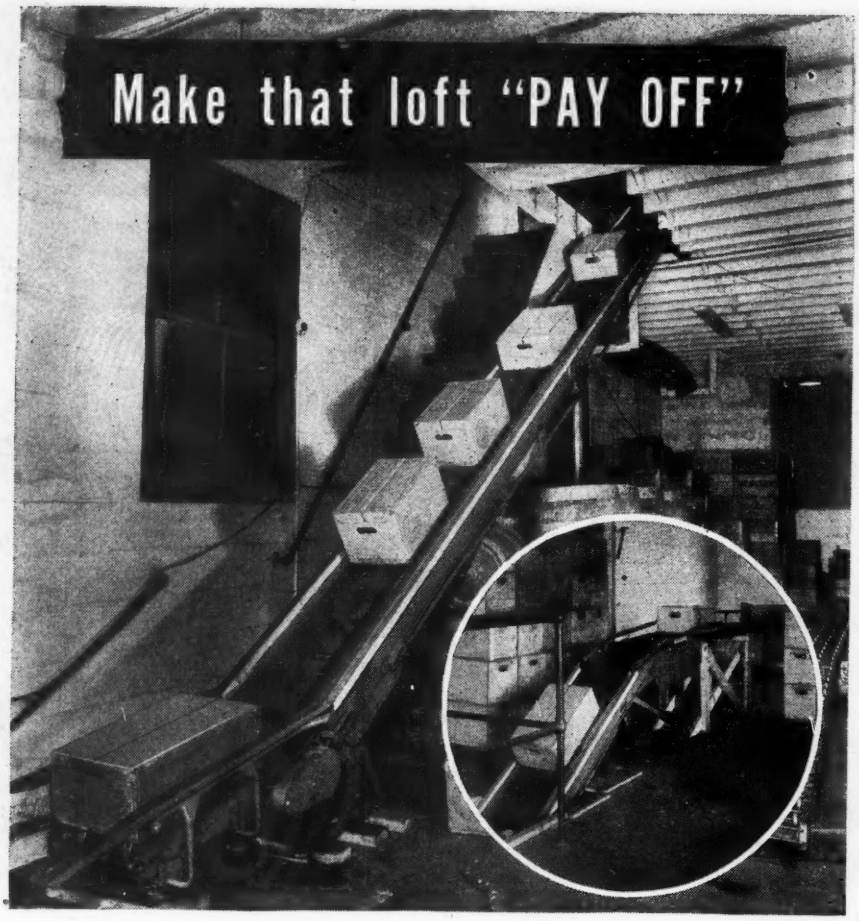
ADDRESS DEPT. F.I.-7

WARREN WEBSTER & COMPANY

Main Office and Works, Camden, New Jersey :: Established 1888

Representatives in principal cities :: In Canada, Darling Bros., Ltd., Montreal

By the makers of Webster Systems of Steam Heating



INACCESSIBLE and unused places in the back room, on the next floor up, back in the loft . . . these spots can be made to "pay-off" in efficient storage if you have the correct handling equipment. Rapids-Standard Floor-Veyors are power belt conveyors manufactured for use in operations between floors. They are standardized units, shipped to you in any specified length up to 30 feet, available in standard belt widths of 10, 12 and 16 inches. As they are boxed and shipped standard, they are ready to install without a lot of difficult erection problems or costly fabrication work.

Floor-Veyors operate on any available electrical current, including regular lighting. They are simple in operation and fool-proof. They will supplement and ease the strain upon freight elevators. They can even be installed in available stairways without causing a bottleneck for the ordinary stairway traffic.

Floor-Veyors are low in first cost and enable you to utilize full storage space, and achieve a simple, speedy flow of goods. Reduce the strain and work in hoisting your materials and products between floors — use a Floor-Veyor and make that loft "pay-off". Write for full information today!

Manufacturers of
STEEL FORGED CASTERS · TRUCKS · CONVEYORS · POWER BOOSTERS

The Rapids-Standard Co., Inc.

Sales Division—361 Peoples National Bank Building Grand Rapids 2, Michigan

"We hope to ascertain not only what the consumer desires in labeling," explained Miss Polly Gade, director of the service, in announcing the survey, "but also how interested she is in any form of voluntary labeling over what is not required by law."

Since members of the service are eligible only if they have been approved by the U. S. Department of Agriculture for U. S. Continuous Plant Inspection, all the labels bear the shielded U. S. grade. Thus, the highly recommended descriptive labeling is not involved.

Included in the study, however, are samples of several brands which show for the first time the new consumer information panel prepared by Miss Gade's office.

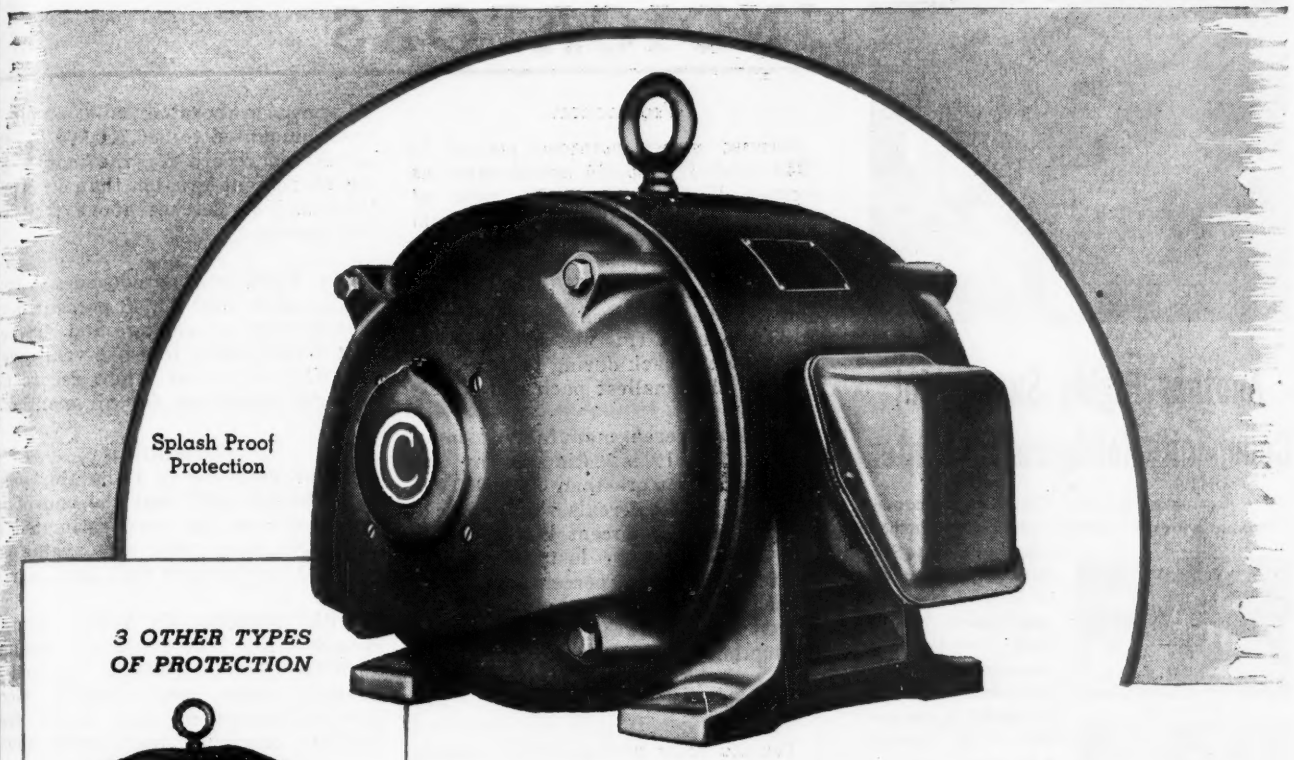
Imports of Candy Show Huge Wartime Increase

IN the face of steadily shortening sugar supplies for the American food processing industries, imports of foreign-made candy are increasing by leaps and bounds, Philip F. Gott, president of the National Confectioners' Association has revealed.

"Cuba's shipments of candy to the United States, as revealed by the Department of Commerce, totalled 626,000 lb. in 1941, 31,643,000 lb. in 1944, or a 4950 percent increase, and 17,220,000 lb. in the first quarter of 1945, at the rate of almost 11,000 percent increase over 1941," Mr. Gott said.

"Argentina's shipments to our country leaped from 4,000 lb. in 1941 to 3,511,000 pounds in 1944, an increase of 87,675 percent, and 1,157,000 in January-March, 1945, or at the rate of 115,600 percent advance over 1941. Mexican candy also was pouring into the United States until an embargo cut shipments from 10,423,000 lb. in 1943 to 3,557,000 in 1944 and 470,000 in the opening quarter of 1945. Canada's candy exports to the United States, although smaller than those from Cuba and Argentina, increased in similar proportions, from 42,000 lb. in 1941 to 612,000 in 1944 and 235,000 in January-March.

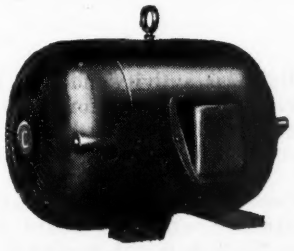
"As foreign-made candy invaded the American market in steadily increasing quantities, War Food Administration information revealed that granulated, cube and table sugar bought in January-April of this year, for Lend-Lease, territorial emergency and other purposes, totalled 133,579,950 lb., including 48,913,950 lb. in April."



Splash Proof Protection

3 OTHER TYPES OF PROTECTION

Form J — General Purpose Application



TEFC — Protects Against Destructive Dust, Grit, Powdered Materials

Century Explosion Proof Motor

Where There Are Splashing Liquids

Guard Against Production Losses With CENTURY SPLASH PROOF MOTORS

Whether yours as an installation is subjected to splashing liquids — or whether your electric motors must withstand plant washdowns — Century Splash Proof motors will give you protection.

Of course, any falling solids are also kept out of the operating parts of the motor by Century's proven splash proof construction.

Special insulation is available for higher concentrations of acids and alkalies.

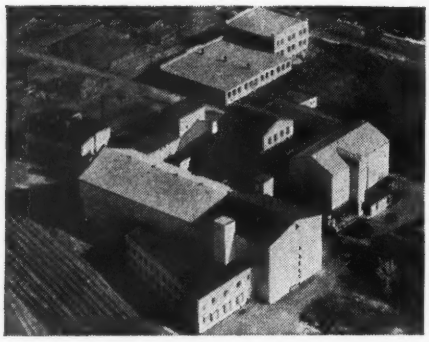
Wherever your electric motors must operate in conditions such as these, for safety's sake, specify Century Splash Proof. A Century engineer will be glad to give you complete details about the advantages of Century motors as they apply to your job.

Century C MOTORS

CENTURY ELECTRIC CO.
1806 Pine Street, St. Louis 3, Missouri

Offices and Stock Points in Principal Cities

384



· Another Highly Successful Community Refrigeration Center

The Consumers Ice and Coal Co., Lancaster, Penna., provides refrigeration service to more than 2500 customers. The plant has been making ice for over 40 years; now produces 90 tons daily, serves town and country routes, and ices refrigerator cars; but ice comprises only one fifth of its business. • Its locker system is one of the largest and finest in the country; complete with processing equipment, chilling and ageing rooms, quick-freezer, and 2200 food compartments; it also has 3 sub-stations in nearby towns. • Thousands of pounds of locally grown fruits and vegetables are cleaned, graded, quick-frozen, packaged, and sold under the "Consumers" label, each season. Four Blizzard freezers handle this load. Six freezer storage rooms hold 3 million lb. of various frozen foods. • Fresh fruits (up to 75,000 bushels) are stored, not to mention carloads of such products as cheese, cream, cabbage, meats, potatoes, etc. • Frick refrigerating, ice-making, quick-freezing, and cold-storage equipment is used throughout. • A similar COMMUNITY REFRIGERATION CENTER could be of great service to YOUR town. Get in touch with your nearest Frick Branch Office, or write direct to

Ice Service

Preparing Locker Foods

Ageing Meat

2200 Food Lockers

Bulk Food Processing

Frick Blizzard Freezers

Packaging Frozen Foods

Frozen Food Storage

FRICK CO.

Waynesboro, Pennsylvania

INDICATORS

Production

Canned sweet potatoes packed in 1944 totaled 1,185,366 actual cases as compared with the 1943 pack of 890,711 cases, according to National Canners Association.

Salmon canned in the United States and Alaska last year amounted to 5,138,649 cases. This was 565,558 cases less than the pack during the previous year an the smallest pack since 1927.

Breakfast cereal manufacture shows huge gains. It is estimated by the industry that more than 1,600,000,000 lb. of breakfast cereals was produced in 1944, a 55.4 percent increase over the 1941 figure. Of last year's production, about 11 percent was purchased by the government for the armed forces. It is predicted that production of breakfast cereals this year will be as high, if not higher, than last year.

Tomato juice production in Canada has been increased from a pack of 6,828 cases of 24 20-oz. tins in 1930 to approximately 4,000,000 cases in 1944. About 70 percent of all the tomatoes processed in Canada are packed in Ontario, with Quebec and British Columbia accounting for the remainder.

Flour production in May was substantially higher then a year ago, according to **The Northwestern Miller.** The May output was 16,230,291 sacks, representing 73 percent of the total output of the United States. This compares with 13,463,582 sacks in May, 1944, and 15,176,472 sacks in April of this year.

Meat output from Federally inspected plants was 8 percent higher in May than in April, but 21 percent less than in May last year, American Meat Institute reports. Production of veal, lamb and pork was 11, 23 and 14 percent greater respectively, than in April. Beef production was approximately the same as in April this year and in May, 1944. The output of veal and pork in May was 9 and 38 percent less, respectively, than a year ago.

Creamery butter produced in April is placed at 122,355,000 lb., the lowest output for the month since 1928 and 15 percent below the 10-year average. The figure, however, is only 6 percent below that of April, 1944.

American cheese production in April was estimated at 81,655,000 lb., 24 percent more than in March. Production during the first four months of this year was 16 percent higher than for the same period of last year and 56 percent above the ten-year average.

Canned evaporated milk ouput in April amounted to 386,750,000 lb., the largest on record for the month, being 23 percent greater than in April, 1944, and 45 percent above the five-year average.

Dry whole milk produced in April totaled 22,800,000 lb., 43 percent more than in April a year ago and 358 percent larger than the five-year average. The output set a new record not only for April but for all months.

Materials

Sugar produced in Cuba this year, with the last mill near the end of its grinding run, has been estimated at 3,923,000 short tons, raw value, or some 30 percent less than last year.

Milk production in April broke all records for the month, totaling 10,800,000,000 lb. But the demand is keeping pace with output. Good pasture conditions and ample feed indicate continued high production.

Egg production for the remainder of the year will be moderately below that of 1944, and for the year as a whole the output is expected to be about 8 percent less than last year. Egg production in 1946 is seen as about the same as this year.

Fats and oils are not likely to improve in respect to the domestic supply until the late spring or summer of 1946. By that time lard production is expected to be up and some copra may be coming from the Philippines.

Indexes

Business avtivity index of **Business Week** stood at 234.5 for the week ending June 9, compared with 234.6 a month earlier and 235.1 a year ago.

Cost of living index of National Industrial Conference Board for May was 106.2. A month earlier it stood at 105.8; a year ago, 104.6.

CONSTRUCTION NEWS

	Pending (thousands)	Awarded June (thousands)	Total Awarded 1945 (thousands)
Bakery	$ 115	$	$ 162
Beverages	250	42	162
Canning and Preserving	215	40	1,100
Cold storage	875	320	1,595
Confectionery	....	....	150
Grain Mill Products	1,257	63	2,040
Ice, Manufactured	80	....	320
Meats and Meat Products	270	....	422
Milk Products	99	....	2,128
Miscellaneous	867	532	8,272
Complete 1945 total	$4,028	$ 997	$16,351

GIVE YOUR PACKAGE THE I.Q. TEST

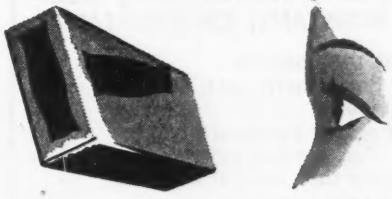
Requirements for Impulse Quota

color

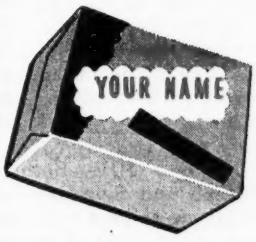
display value

selling copy

eye appeal



brand identity



Your package must have these vital ingredients to be self-selling in a market where products will have to sell themselves! Each factor is a powerful entity... carefully built into the final design by expert artists and designers. Make sure the consumer will "Obey that impulse" by giving your package this I.Q. test... make doubly sure by educating your package at MILPRINT!

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WAR PRODUCTS DIVISION

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WATER-PROOF, ALKALI-PROOF, STAIN-PROOF, ACID-RESISTANT, OIL-RESISTANT

NO LAUNDERING
Save their cost over and over again!

TOPMOST PROTECTION
Far greater safeguard to clothing than ordinary aprons!

AMAZING STRENGTH
Plus lightness in weight for utmost wearing comfort!

4 COLORS

4 SIZES

——PRICES — SIZES — COLORS——

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27 x 36...$8.40 per doz.
30 x 36... 9.78 per doz.
36 x 40...11.90 per doz.
36 x 44...12.60 per doz.
Full Length Sleeves $9.66 per dozen pair
Leggings, Hip Length $11.90 per dozen pair

ALL WHITE
27 x 36...$6.88 per doz.
30 x 36.. 7.65 per doz.
36 x 40.. 9.35 per doz.
36 x 44.. 10.18 per doz.
Full Length Sleeves $7.15 per dozen pair

BLACK NEOPRENE
27 x 36..$12.90 per doz.
30 x 36.. 14.00 per doz.
36 x 40.. 18.33 per doz.
36 x 44.. 20.50 per doz.
Full Length Sleeves $12.90 per dozen pair
Leggings, Hip Length $23.50 per dozen pair

OLIVE GREEN
27 x 36.. $6.27 per doz.
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What Washington Thinks

By R. S. McBRIDE, Washington, D. C.

PEAKS TO COME—Reduced production of munitions already affords some industrial relief throughout the country but three major scarcities are certain to "plague food factories" for a long time. Pacific warfare will make fuel scarce. It will make freight transportation even more difficult. It will reduce the supply of desirable food containers still further. Technologists planning for the next season's business might as well face these three peaks of difficulty still ahead.

SUBCONTRACTOR CLAIMS—Subcontractors facing the termination of arrangements with the government where the principal contractor is threatened with insolvency or other difficulty can secure protection from Uncle Sam. The Office of Contract Settlement has definite regulations to protect such subcontractors against needless loss where principal firms are in financial difficulty. This is very desirable as a matter of justice, since certain subcontractors have been forced by patriotic motives to work with firms that they normally would not choose to serve.

POINTS UNTIL 1950?—Senator says that food will have to be rationed until 1950. The Senator probably knows nothing about the facts that far ahead. Even those well informed about foods do not either. But if present Washington muddling is any index, we doubt if we will ever get rid of rationing, black markets and other food troubles. Washington still hopes that some Moses will appear to lead us into the promised land of adequate food supply.

LATIN FOOD PLANTS—American firms establishing branches abroad are confronted with many serious difficulties. In Latin America there are many restrictions on enterprise that is not native to the country of operation. Just lately Guatemala has ruled that 75 percent of the total payroll of factory workers must go to citizens of that Republic. American managements have to look into such rules very carefully when they go abroad with part of their business.

MORE BUILDING SOON—One of the earliest evidences of relaxation of government control has been a lightening of the restrictions on what can be built or remodeled or repaired. The lid is not off altogether yet, but any really important enterprise serving the public by food manufacture can now do many times as much with a special permit as was possible even a few weeks ago. Perhaps we shall see some large benefits in the food plants from this result of V-E Day.

NEW GEOGRAPHY — Washington observers are having great difficulty interpreting the new ICC decision on rail freight rates. All class rates through the country are to be on an identical basis. But it is going to be months before industry will know just exactly what this means, and still longer before the new rates can be calculated in terms of best plant locations. But it is clear that some new areas of manufacturing success have been opened up by the change in the realtive cost of moving from the South and the West. Perhaps this even means that food technologists must do their geography "homework" over again when considering new plant sites.

A JOB FOR G-I JOE—Both the Veterans Bureau and Selective Service are undertaking to give very broad interpretation to the right of veterans who come back and want their prewar jobs again as a legal right. It is going to be very important that food-plant employers do not casually refuse such veterans, as their rights are intentionally made very broad and very definite in the law.

NEW FOOD STAMPS—The plan to issue food stamps to low-income families for use of surplus foods is wholly a postwar plan. It is now sleep-

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DIRECTOR OF CIRCULATION, FOOD INDUSTRIES
330 WEST 42nd STREET, NEW YORK 18, N. Y.

Please change the address of my Food Industries subscription.

Name .....

Old Address .....

New Address .....

New Company Connection .....

New Title or Position .....

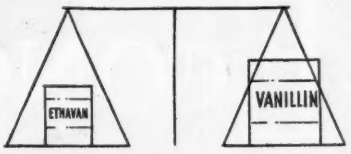
ing. But it will wake up with a jump as soon as hard times or extensive unemployment make it again a good political program. Food manufacturers will hope that the supplies of food to be so distributed are really surpluses. No matter how great the domestic needs, any stamp plan is dangerous if it does not use principally, if not wholly, goods that otherwise would not get sold to those needing them. Food stamps would be altogether out of place in a period of scarcity such as now prevails.

CEILING PRICE—New package sizes are discouraged in some industries by requiring the use of a ceiling price not greater than that of the next smaller size package. That is the OPA ruling regarding popcorn products. It is the sort of ruling which OPA would like to use in its attempt to keep down food prices in other fields more important than popcorn. Certainly it penalizes the new package user.

HIGHER MINIMUM—A definite campaign has been started by organized labor to have Congress fix a substantially higher minimum wage in all industry. Some recent literature of CIO is described by it as "a conclusive argument in favor of the 65 cent an hour minimum wage." Any food technologist who neglects the trend to higher minimum is going to be sadly disappointed, even though it is not likely that this CIO argument will be fully accepted by Congress at all soon.

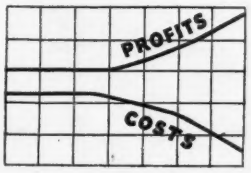
EXPORTER WORRIES—The Supreme Court has told export associations organized under the Webb-Pomerene Law that they are not only subject to Federal Trade Commission administration but also subject to a Department of Justice suit if their activities take on monopoly characteristics. Thus one of the previously assumed advantages of these export associations becomes a doubtful value. Food company lawyers are going to study the court ruling on the Alkali Export Association cases with great care.

Foremen—Organization of foremen is an important part of managements' job today. These junior executives can be made a part of management and thus detached from the general bargining units of the employees whom they direct. But the foremen themselves must have machinery to have their own troubles promptly handled by management. Specific plans have been urged on a dozen big corporation managements by National War Labor Board. Any food firms that have not considered these possibilities can well do so. If considered in advance, they become opportunities for good will throughout the staff. Neglected, they create peculiar difficulties for which there is no easy remedy.



for greater flavoring strength

for a richer bouquet



at lower costs

specify

ETHAVAN

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USERS REPORT ADVANTAGES Most users have found that Ethavan has a relative flavoring strength three times that of vanillin . . . which means substantially lower costs.

They also report that Ethavan has a richer, more pleasing bouquet . . . which often means a finished product with markedly increased sales appeal.

And bakers, in particular, add that Ethavan "stays" better in the finished product even though it is processed at high heat.

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Vanillin Monsanto
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MEN • JOBS • COMPANIES

INDUSTRY

Borden Cheese Co. is building two additions to its plant at Van Wert, Ohio. One is to be used for production of powdered milk, and the other for a new cream cheese product.

Cargill, Inc., Minneapolis, has purchased the Cedar Rapids, Iowa, plant of Honeymead Products Co., soybean and feed firm. D. O. Andreas, vice-president and general manager of the Honeymead firm, will continue as manager under the new ownership.

Froedtert Grain & Malting Co., Inc., Milwaukee, has purchased a grain elevator in Minneapolis, Minn., having a total grain capacity of 3,500,000 bu., according to Kurtis R. Froedtert, chairman of the board and president of the company.

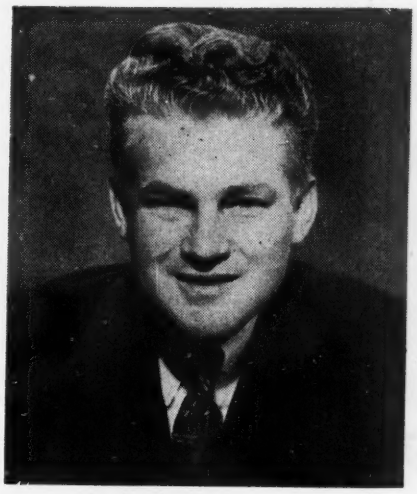
Grandma Cookie Co., Pratt, Tex., was destroyed by a $250,000 fire on May 25. Other fires reported recently were: Lake Erie Canning Co., Sandusky, Ohio, with estimated loss of $100,000, and the cannery plant of Brown & Book Inc., Westfield, N. Y., where damage was also figured at $100,000.

Holly Sugar Corp., Colorado Springs, Colo., plans to operate its beet factories at Alvarado, Calif., and Sheridan, Wyo., this fall for the first time since 1942.

The Kadota Fig Asspciation canning plant at Merced, Calif., which last year in its first year of operation, processed nearly 1,000,000 cases of canned fruits and vegetables, expects to double its capacity this year, according to R. D. Leuscher, chairman of the association's board of directors. The armed forces have contracted for 80 percent of the company's output.

Kelly Douglas & Co., Ltd., Vancouver, has purchased additional ground and plans to erect a plant costing approximately $400,000. The new buildings will accommodate the various spice, canned foods and other manufacturing plants operated by the company in the Vancouver area.

Kuhner Packing Co., Muncie, Ind., has purchased the assets and business of the John H. Marhoefer Co., Fort Wayne, Ind. John H. Marhoefer will become vice-president in charge of purchasing and production for the Kuhner Co. Combined facilities include the two plants in Muncie and Fort Wayne and the Marhoefer sausage plant in Chicago.



RICHARD J. RITCHIE
At a recent meeting of the board of directors of the Pepsi-Cola Co., Richard J. Ritchie was elected vice-president of research and director of the laboratory. He has recently been serving the company as chief chemist.

W. HOWARD CHASE
General Foods Corporation has announced the appointment of W. Howard Chase as director of public relations. He was formerly director of the department of public services of General Mills, Inc.

Kroger Grocery & Baking Co. has added a third packing plant to its production facilities with the acquisition of the Cook Packing Co., Scotts Bluff, Neb. This plant handles about 1,000 cattle, 2,500 hogs and 6,000 lambs weekly. Other Kroger plants are at Omaha and Columbus, O.

National Tile Co., Anderson, Ind., peacetime manufacturer of white tile for buildings, is now using the same machines to make approximately 500,000 cakes of prepared cocoa daily for the Army Quartermaster.

DAN GERBER
Formerly vice-president of Gerber Products Co., Dan Gerber was elected president at the annual meeting of the Board of Directors in Fremont, Mich. The retiring president, Frank Gerber, founder of the firm, was named chairman of the board.

Pet Milk Co., Bryan, Ohio, is building a warehouse addition to its plant in Bryan, at a cost of $40,000.

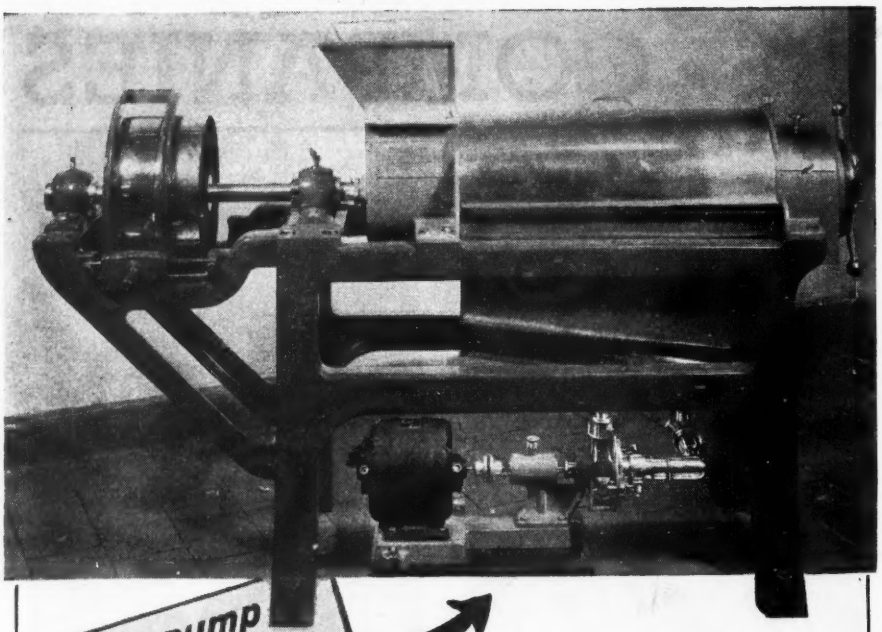
Pratt-Low Preserving Co., pioneer Santa Clara, Calif., canning firm, has been acquired by H. A. Irving of San Francisco, who is associated with the Carmel Canning Co., Monterey, Calif.

Smithfield Packing Co. has been authorized by the Virginia Corporation Commission to increase its maximum capital stock from $400,000 to $1,000,000.. John S. Martin is the acting president of the ham-curing concern.

Stoops Packing Co., with canning plants in Van Wert and Morral, Ohio, has been sold to the St. Mary's Packing Co., which owns and operates 12 other canning factories in Ohio, Indiana and Wisconsin. Personnel of the Stoops plants will remain unchanged, and A. Holmes Stoops, general manager, will continue with the company for the time being.

Southern Dairies, Inc., Atlanta, Ga., is undertaking a $60,000 expansion program which will provide approximately 40 percent more plant space.

University of California, Berkeley, is holding classes in food processing for representatives of several foreign countries. Ancient skills such as wine making and curing olives are being mastered by citizens from China, Egypt and India, as well as newer methods of preserving food by canning, freezing and dehydration.



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4. Custom Fabrication
5. Sediment Testers
6. Line Filters

Standardized Accuracy and Interchangeability are YOUR Tri-Clover Guarantee.

Besides pumping all types of Milk Products, TRI-CLOVER Pumps are being used to handle all vegetables, soups, fruits and fruit juices in canning industries, and in the carbonated beverage industry. These Pumps have likewise been found to be very successful in handling ice cream mix and all other types of products in which churning, whipping or bacterial contamination are important factors in the final products. Write for the TRI-CLOVER Catalog.

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ESSENTIAL DAIRY FOODS

Try TRI-CLOVER MACHINE CO.

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KENOSHA, WISCONSIN

PERSONNEL

Dr. V. L. Alford, for several years nutritionist with the Transit Grain Co., Fort Worth, Tex., has joined Shellabarger Feed Mills, Salina, Kan., as head of nutritional merchandising activities.

A. C. Allison, formerly assistant manager of the Cleveland branch of Fairmont Creamery Co., has been named manager of the company's branch at Green Bay, Wis. Prior to going to Cleveland, he was manager of the Youngstown branch.

Frederic G. Berner has been appointed vice-president and general manager of G. Washington Coffee Refining Co., an affiliate of American Home Foods, Inc.

Samuel M. Blakemore, formerly research chemist for General Foods Corp. and California Packing Corp., has been elected president of the Churngold Corp., Cincinnati.

Dr. William B. Bradley has been appointed head of the research laboratories of the American Institute of Baking. He has just completed three year's service as an aviation physiologist with the Army Air Forces.

Frank P. Corso has been elected president of Southern Wholesale Confectioners Association, Inc., Atlanta, Ga., following the resignation of A. R. Liddell.

Milton H. Faulring, for several years manager of the Toledo plant of the Archer-Daniels-Midland Co., has been named manager of the company's Texas interests, with headquarters in Gonada, Tex. D. F. Holbert, mill superintendent, succeeds Mr. Faulring as manager in Toledo.

Dr. James T. Lowe, who has been with the Wisconsin Alumni Research Foundation, has been appointed director of nutritional research for Nestle's Milk Products, Inc., Chicago.

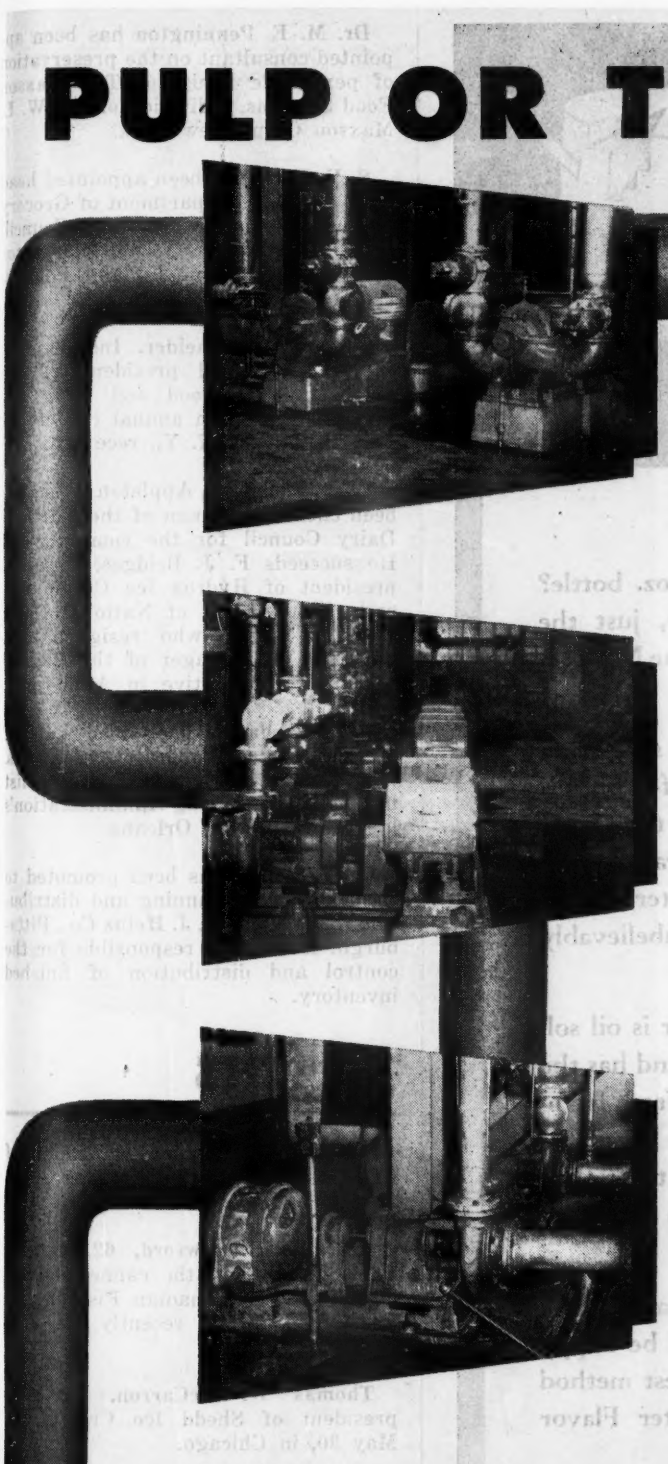
Dr. Carl M. Marberg, organic chemist, has joined the staff of the Midwest Research Institute, Kansas City, Mo. He has been associated with the Interchemical Corporation, New York, where he specialized in work on proteins and pharmaceuticals.

William J. Ocken, formerly superintendent of bakery production for National Tea Co., Chicago, is now on the bakery production service staff of Pillsbury Mills, Inc., with offices in Chicago.

John P. O'Rourke, president of O'Rourke Co., Inc., Buffalo, has been elected a director and chairman of the board of the Nashua Baking Co., Nashua, N. H.

PULP OR THIN JUICE

BYRON JACKSON SUGAR PUMPS SERVE PROCESSING OPERATIONS ALL ALONG THE FLOW LINE



TOP PHOTOGRAPH—Two type "S" pumps—one handling overflow from first carbonation thickener—the other handling thin juice to the boiler.

SECOND PHOTOGRAPH—Handling various wastes and water from the vacuum filters—in hot and cold saccharate service—first carbonation.

THIRD PHOTOGRAPH—Handling a mixture of thick juice and melted sugar—high melter or standard liquor service—replacing reciprocating and roto turbine pumps.

BOTTOM PHOTOGRAPH—A 6" Pulp Pump, designed for this particular service and replacing two conventional pumps of the same size, neither of which handled the pulp as satisfactorily as this single pump, and both of which were subject to frequent mechanical difficulties.

These typical pump applications in a sugar refinery are illustrative of the many special service pumps available to the food processing industry through Byron Jackson engineering. Let us consult with you regarding your process pump requirements.

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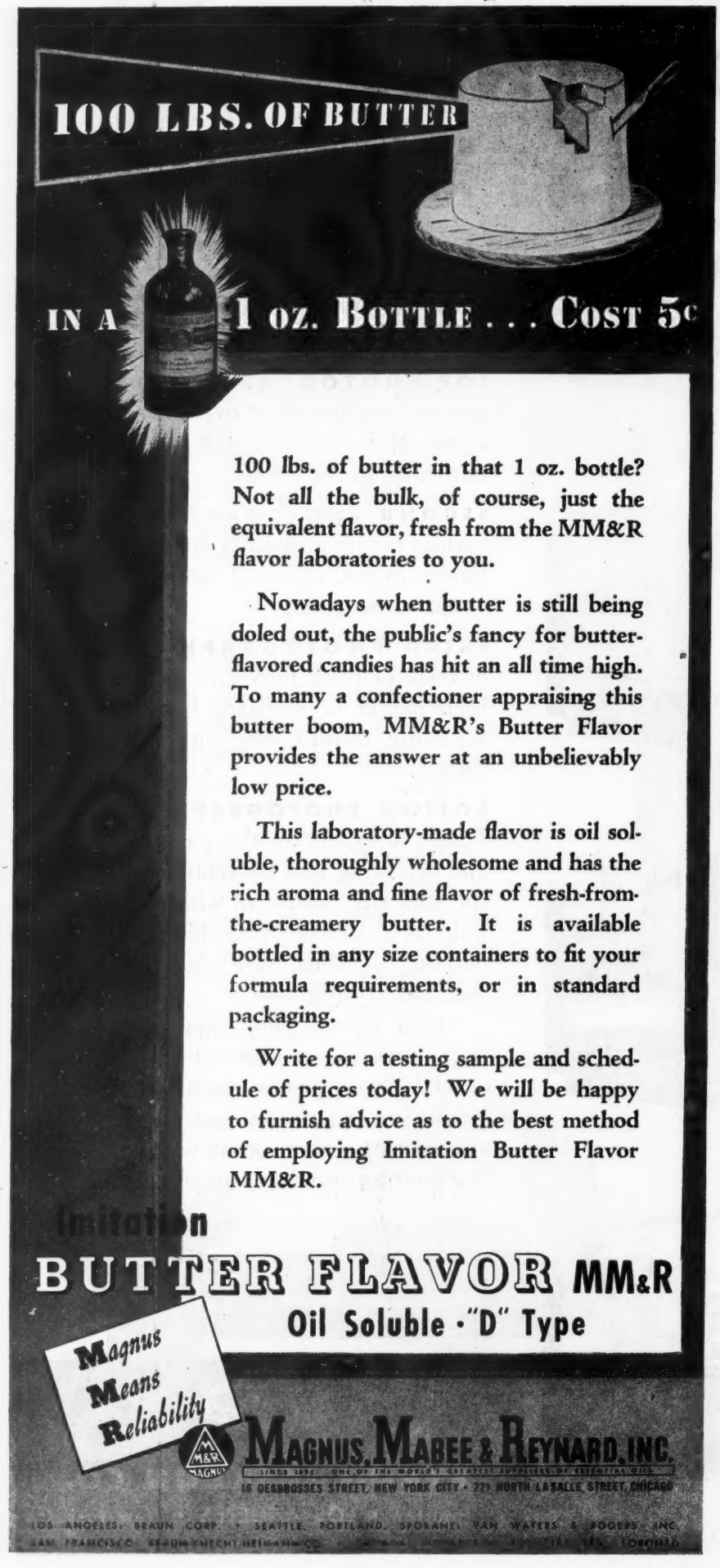
100 LBS. OF BUTTER
IN A 1 OZ. BOTTLE . . . COST 5c
100 lbs. of butter in that 1 oz. bottle? Not all the bulk, of course, just the equivalent flavor, fresh from the MM&R flavor laboratories to you.
Nowadays when butter is still being doled out, the public's fancy for butter-flavored candies has hit an all time high. To many a confectioner appraising this butter boom, MM&R's Butter Flavor provides the answer at an unbelievably low price.
This laboratory-made flavor is oil soluble, thoroughly wholesome and has the rich aroma and fine flavor of fresh-from-the-creamery butter. It is available bottled in any size containers to fit your formula requirements, or in standard packaging.
Write for a testing sample and schedule of prices today! We will be happy to furnish advice as to the best method of employing Imitation Butter Flavor MM&R.
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BUTTER FLAVOR MM&R
Oil Soluble · "D" Type
Magnus Means Reliability
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Dr. M. E. Pennington has been appointed consultant on the preservation of perishable foods for The Maxson Food Systems, a division of the W. L. Maxson Corp., New York.

S. V. Reiss has been appointed head of the research department of Grocery Manufacturers' Information Council, New York. He was formerly director of research for the Cudahy Packing Co.

Joseph C. Schneider, Indianapolis, Ind., was elected president of the Association of Food and Drug Officials, at the 49th annual conference held in Buffalo, N. Y., recently.

E. W. Tiedeman, Appleton, Wis., has been chosen chairman of the National Dairy Council for the coming year. He succeeds F. J. Bridges, formerly president of Hydrox Ice Cream Co., and vice-president of National Dairy Products Corp., who resigned. Mr. Tiedeman is manager of the Central Grade A Cooperative in Appleton.

R. L. Vandaveer has joined the staff of The Dallas Laboratories, Dallas, Tex. He previously was chief chemist in the Food and Drug Administration's laboratory in New Orleans.

O. W. Woods has been promoted to the position of planning and distribution manager at H. J. Heinz Co., Pittsburgh. He will be responsible for the control and distribution of finished inventory.

DEATHS

Adam W. Baetz, 67, founder of Baetz Dairy, Lorain, Ohio, May 22, at Lorain.

George E. Crawford, 62, general sales manager of the canned salmon department of Canadian Fishing Co., Vancouver, B. C., recently, in Vancouver.

Thomas W. McCarron, 79, vice-president of Shedd Ice Cream Co., May 30, in Chicago.

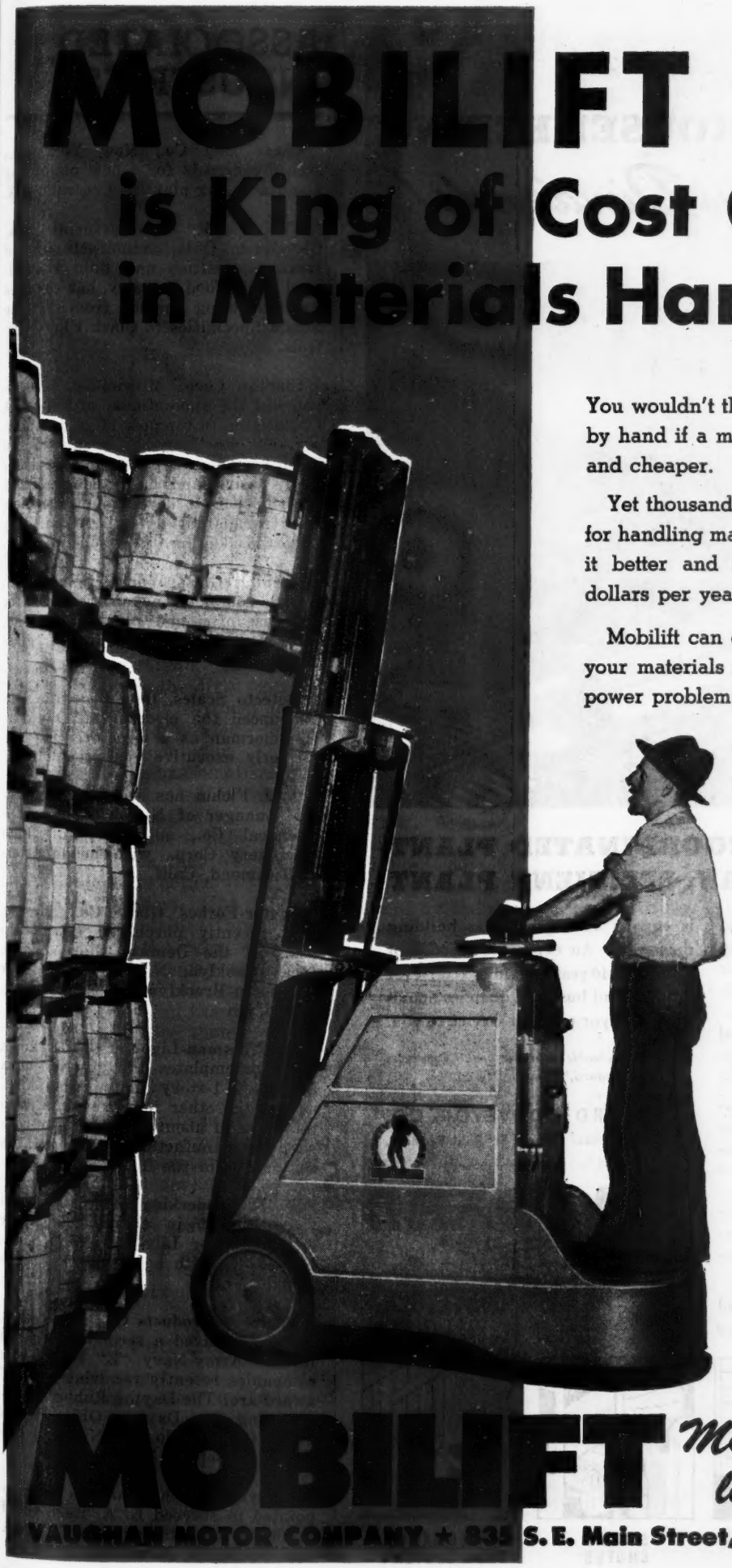
A. L. Murphy, 66, retired executive of Swift & Co., May 28, at Jacksonville, Fla.

William B. Stokely, Sr., 72 a founder and former president of Stokley Brothers & Co., Inc., now Stokely-Van Camp, Inc., May 25, at Newport, Tenn.

E. C. Thatcher, president of DeGraff Food Co., DeGraff, Ohio, and former president of Ohio Canners' Association, April 30, at Elyria, Ohio.

John A. Yung, 68, president of Yung-Mueller Bakery Co., St. Louis, Mo., May 20, in Lantana, Fla.

MOBILIFT is King of Cost Cutters in Materials Handling!



You wouldn't think of manufacturing a product by hand if a machine could do it better, faster and cheaper.

Yet thousands of firms are using hand trucks for handling materials when a Mobilift could do it better and faster—and save thousands of dollars per year in handling costs.

Mobilift can do it in your plant. It will move your materials **faster!** It will solve your manpower problem over night. It will reduce accidents to workmen and damage to merchandise. Mobilift will load, stack and transport your materials without wasteful rehandling.

Prove it to yourself. A Mobilift engineer will be glad to show you how you can cut your handling costs. Send for particular information and suggestions—**today.**

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INDUSTRIAL "GOOD HOUSEKEEPING" *Pays Dividends!*

. . . A CONVEYOR-COORDINATED PLANT IS USUALLY A CLEAN, EFFICIENT PLANT

ORDER and cleanliness — freedom from congestion—smooth flowing channels for production — safety for workers — these are important additional advantages gained from conveyors — they contribute substantial added savings to time and handling-cost economies conveyors provide.

The steps you take now — the investment in conveyors that you make at this time to coordinate your production — eliminate disorder and confusion — cut your handling costs — will not only pay immediate dividends but yield an even greater return in the days of competitive production to come.

Knowing how to apply power and gravity conveyors to best advantage is equally as important as building them well. An experience record of more than 40 years, serving all classes of industry and business, qualifies Standard Conveyor to be of service to you.

Write for valuable reference book "Conveyors by Standard," Catalog No. FI75.

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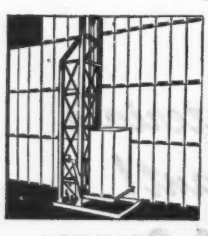

TIERING AND LIFTING MACHINES

PORTABLE PILERS

SPIRAL CHUTES

PNEUMATIC TUBE SYSTEMS

ASSOCIATED INDUSTRIES

Chase Bag Co., New York, has signed contracts for a new paper bag manufacturing plant at Crossett, Ark.

The Clark Manufacturing Co., Cleveland, Ohio, manufacturers of steam specialties and fluid controls used in the food industry, has changed its marketing name from Strong Steam Specialties to Clark Fluid Controls.

Clarvan Corp., Milwaukee, has announced the appointment of Frederick C. Edelston to the post of sales manager. Mr. Edelston has been engaged in all branches of packaging work for many years, and has made valuable contributions to developments in flexible transparent as well as military export packaging.

Corning Glass Works, Corning, N. Y., has completed negotiations for the purchase of a new plant at Leaside, Ont., for the manufacture of glass baking ware.

Detecto Scales, Inc., Brooklyn, has announced the election of David S. Hammerman as a director. He was formerly executive vice-president.

A. J. Flebut has been named western manager of Niagara Sprayer & Chemical Co., subsidiary of Food Machinery Corp., with headquarters in Richmond, Calif.

Foster-Forbes Glass Co., Marion, Ind., recently purchased all of the stock of the Demuth Glass Works, Inc., Brooklyn, N. Y., with plants located in Brooklyn and Parkersburg, W. Va.

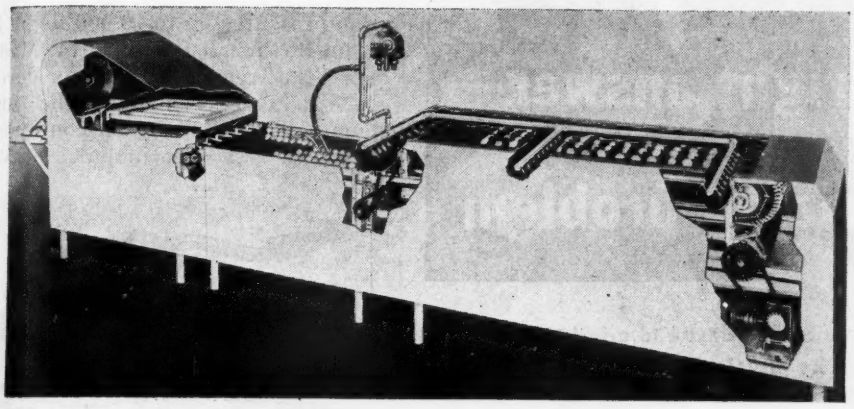
The Hussman-Ligonier Co., St. Louis, Mo., contemplates the erection of a group of 1-story factory buildings, as well as other improvements, at a total cost of about $500,000. The company manufactures refrigeration equipment for the food industry.

W. R. Lenderking has been elected vice-president in charge of Pacific operations for Lily-Tulip Cup Corp., New York, with headquarters in Los Angeles.

Shellmar Products Co., Mt. Vernon, O., has received a second white star for its Army-Navy "E" flag. Other companies recently receiving the "E" award are: The Dayton Rubber Manufacturing Co., Dayton, Ohio, Buffalo Forge Co., Buffalo, and National Battery Co., Depew, N. Y.

Gladys A. Techtmann has been appointed to succeed E. A. Beyersdorff, in charge of national sales for Pack-Rite Machines, Milwaukee.

FOOD EQUIPMENT NEWS



Automatic egg washer and dryer.

Egg Washer and Dryer

AUTOMATIC egg washers and dryers, which are said to be easy to operate, have been developed by Gordon Johnson Co., 1012 Baltimore Ave., Kansas City 6, Mo. The operator simply removes the dirty eggs from the case and places them in individual rubber-protected compartments of the conveyor. The eggs are then handled automatically until ready to be recased or ready for the breaking room.

Rubber retainers hold the eggs on a belt while they are scrubbed by the vigorous action of thousands of rubber fingers. The unit contains no soak tank. Three sets of sprays wash the eggs with clean water, and this spray system permits the use of 150-deg. F. water without increasing the temperature of the eggs more than a few degrees. Sprays are strategically located to make the machine self-cleaning.

Separately available is an automatic regulating valve which controls spray temperature at 150 deg. regardless of steam and water pressure or temperature of water. A battery of six ultraviolet lamps is located in the unit to sterilize the eggs and eliminate the need of any germicidal solutions.

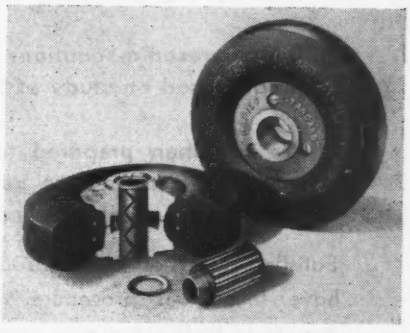
Improved Pea Grader

FOOD MACHINERY CORP., Hoopeston, Ill., has announced an improved specific gravity pea grader, known as the Lewis. The improvement includes a rotating cone in the center of the machine to replace the former stationary cone, which is said to eliminate eddies and countercurrents which sometimes caused hard peas to get mixed with tender ones. The flow of brine through the machine causes the cone to revolve, breaking up the eddies and speeding the movement of peas from the machine.

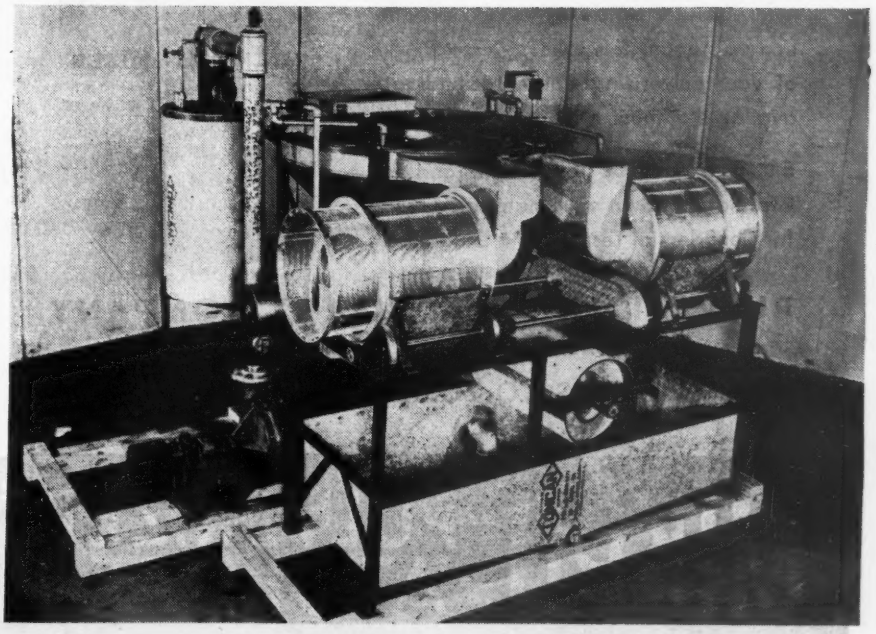
Peas enter the machine through a feed hopper on top, which discharges below the surface of the brine. The circulating brine enters the separating tank through the bottom and at a tangent so as to cause the entire tankful of brine to whirl. As peas are admitted to the brine, the more tender ones, being lighter, float to the top and are carried around to the discharge point by the circular motion of the brine. They are emptied onto a perforated inclined chute which separates the brine from the peas, the peas being delivered to a conveyor belt. The firm or older peas have a higher specific gravity and therefore sink to the bottom. These are caught by the whirling brine and discharged to a bottom outlet. The upward current effect in this machine enables it to separate peas of much lower density than can be separated by other methods, resulting in savings in salt.

Rubber Wheel

A RUBBER wheel with large demountable roller bearings has been announced by Rapids-Standard Co., Inc., 308 Peoples National Bank Bldg., Grand Rapids 2, Mich. This wheel has been designed for use on materials-handling equipment requiring greater capacity than the ordinary wheel will permit. It is 6 in. in diameter and has a 2-in. face. Axle sizes are ¾, ⅝ and ½ in.; hub length, 2 3/16 in.



Heavy-section rubber wheel.



Improved specific gravity pea grader.

6 Easy Steps to the right answer to your pulverizing problem

1 Send us a quantity of the material you desire to grind together with complete information on its physical characteristics and the results you desire.

2 Check will be made against records of our experience based on findings in over 22,000 tests on all kinds of materials.

3 Your material will be given test grinds on regular production Mikros of all standard sizes.

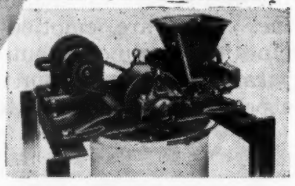
4 A full report outlining the proper procedure will then be rendered giving you full information as to all our findings.

5 Definite recommendations on proper size and type unit will be made based on study of these test results.

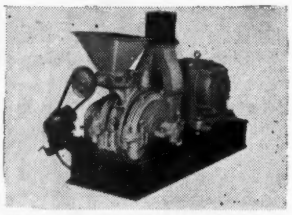
6 We are then prepared to submit a formal proposal with adequate performance guarantees and full specifications of the machine recommended.

Satisfied users of over 4,000 Mikros have found this procedure the *right* answer to their pulverizing problems, to obtaining a higher return on their investment, greater efficiency in their production operation. This takes guesswork out of your pulverizing. These facilities are available without obligation.

MIKRO-PULVERIZER*



MIKRO-ATOMIZER



SEND a 5 to 50 lb. sample and full information about your material, or send for Confidential Test Griding Data Sheet.

*Trade Mark Reg. U. S. Pat. Off.

PULVERIZING MACHINERY COMPANY

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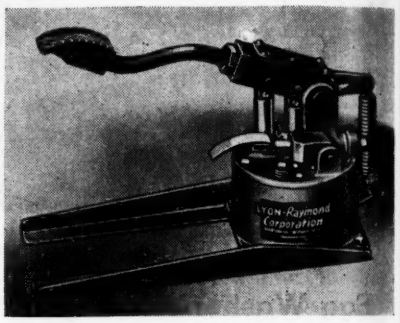
NOW...2 TYPES TO MEET MOST PROCESS JOBS

MIKRO-PULVERIZER* (FINE)
MIKRO-ATOMIZER (ULTRA FINE)

The heavy-section wheel, which has a capacity of approximately 250 lb., is held in place by two locking hub plates of magnesium.

Hydraulic Foot Pump

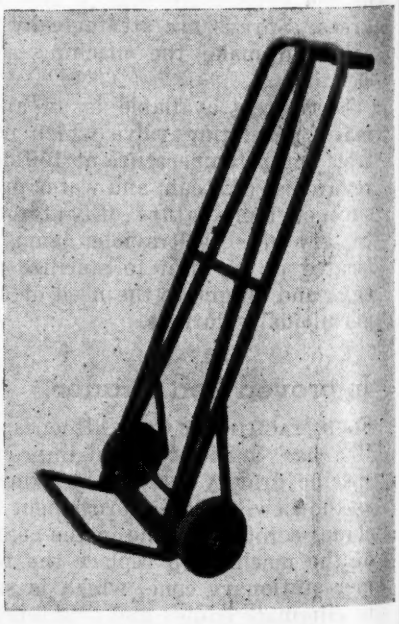
FOR pressures up to 10,000 lb. p.s.i., Lyon-Raymond Corp., 2014 Madison St., Greene, N. Y., has developed a two-speed hydraulic foot pump. The pump is self-contained, designed for continuous, heavy-duty performance. It can be furnished with a base suitable for mounting or with an auxiliary base allowing it to be used on the floor without fastening.



Hydraulic foot pump.

Light One-Hand Truck

COMBINING minimum weight with maximum strength and balance for smooth wheeling under heavy loads, a light one-hand truck is manufactured by the Towsley Trucks, Inc., 1659 Elmore St., Cincinnati 23, Ohio. The weight of the truck is 27 lb. Frame is channel iron, all-welded construction. Truck is equipped with silent 6-in. molded-on or cushion rubber wheels.



Light one-hand truck.

HANDLING+Processing+HANDLING+Assembling+HANDLING+Packing+HANDLING+Storage+HANDLING

HANDLING—the Common Denominator of PRODUCTION

LET MEN DIRECT POWER—NOT GENERATE IT!

Handling is everything in storage, warehouse, dock and terminal operations. Since moving materials is the primary function of such operations, only the most efficient handling system can make them profitable and effective.

The Towmotor Material Handling Analysis Guide suggests and illustrates practical ways of developing an efficient handling system. Write for your copy today.

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From SMOKING SAUSAGE
Racks of sausages are easily moved into smoke ovens.
To RIPENING BANANAS
2-way switch for handling bananas in and out of ripening room.

AMERICAN MONORAIL Overhead Handling Systems have a universal range of uses in the food processing industry. From receiving room to shipping room there is American MonoRail equipment that does the job of handling better, quicker and more economically. You can speed up production, eliminate all manual handling and rehandling, move materials on quick accurate schedules, and do it at a great savings in cost. Let an American MonoRail Engineer show you "all round savings" with this equipment—write today!

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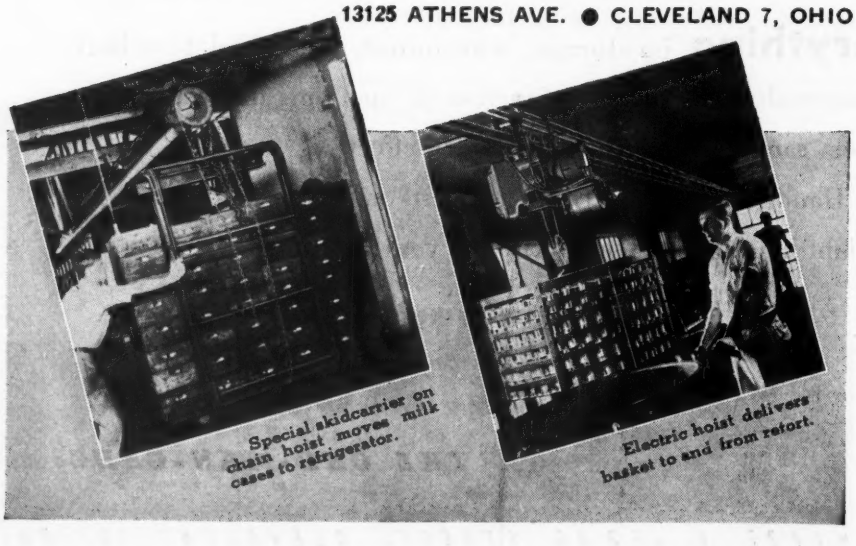
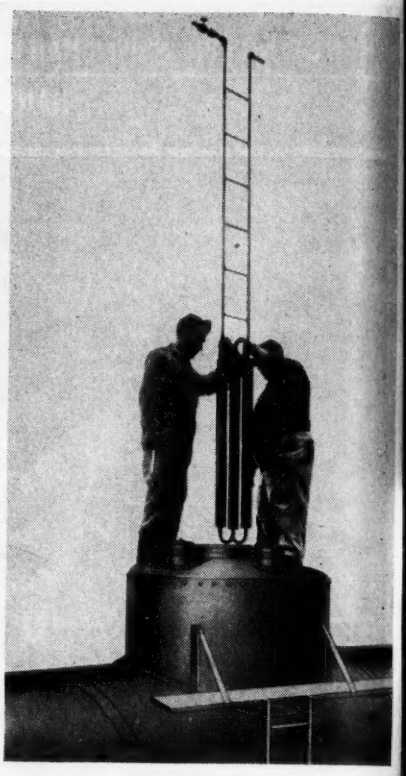

Special skidcarrier on chain hoist moves milk cases to refrigerator.
Electric hoist delivers basket to and from retort.



Immersion steam tank heater.

Immersion Tank Heater

INTENDED for materials whose viscosity can be lowered by heating an immersion-type steam tank heater has been introduced by Brown Fintube Co., 160 Filbert St., Elyria, Ohio. The heater consists of a number of lengths of fintubes connected in series, and inlet and outlet steam lines. It has a low center of gravity and can be handled safely by one man or very easily by two men. Cross handles aid in positioning the heater over the discharge outlet in the tank, in blocking the heater at various depths and in removing the unit after the tank is empty. The heater speeds the emptying of certain viscous materials from tank cars. It can be furnished in two sizes—one for tank cars and one for tank trucks.

Vacuum Recorders

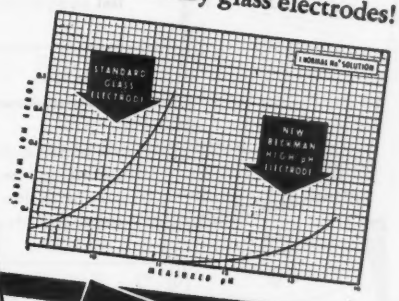
PRECISION SCIENTIFIC Co., 1750 Springfield Ave., Chicago 47, announces two new vacuum recording instruments. One is the "MR" Televac. It utilizes a new thermal gage with specially treated elements and has a range of 0 to 500 microns. Features include coated filaments to prevent "off calibration" due to water, oil vapor or other contaminating vapors. Increased sensitivity gained through use of two filaments in both standard and variable tubes of the vacuum gage is achieved. All gages

Check your knowledge of pH

Do you know the answers to these important pH questions?

Q. *There is only ONE make of modern pH equipment with which accurate pH measurements can be made in highly alkaline solutions, even in the presence of sodium ions. Do you know what that make is?*

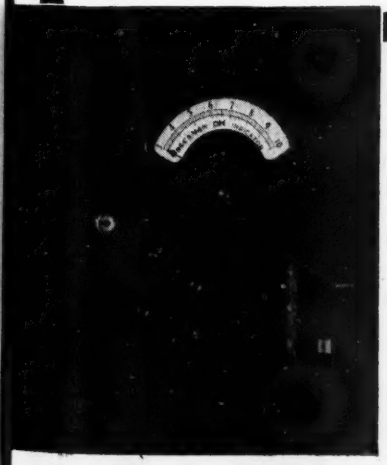
A. Beckman pH equipment—and *only* Beckman equipment! Note in chart the accuracy of Beckman Type E Glass Electrode in highly alkaline solutions compared with ordinary glass electrodes!



Q. *There is only ONE make of pH equipment with which glass electrode pH measurements can be made in boiling hot process solutions. Do you know the name of this equipment?*

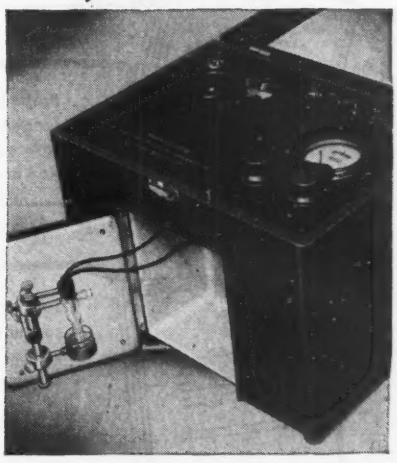
A. Again Beckman—and *only* Beckman! With Beckman High Temperature Glass Electrodes, continuous pH measurements can be made in solutions as hot as 100°C (212°F). This feature is highly important to consider in the purchase of pH equipment for *any* purpose. Even though your present operations may not involve hot solutions, you never know when changes or additions to your operations may obsolete equipment not providing this feature. Buy Beckman to begin with *and be sure!*

There's a Beckman pH instrument for your requirement.



Beckman Automatic pH Indicator
The most advanced pH instrument available for large-scale pH control. Indicates pH completely automatically. Also operates pH recording and control equipment!

Beckman Industrial pH Meter
Combines high accuracy with knockabout ruggedness for portable plant and field use. Gives instant pH readings at the touch of a button. Also *continuous* indication!



Beckman Laboratory pH Meter
Combines high precision with wide versatility to meet every laboratory and research need.

Free! "What Every Executive Should Know About pH"—a helpful factual guide to modern pH control. Send for your copy.

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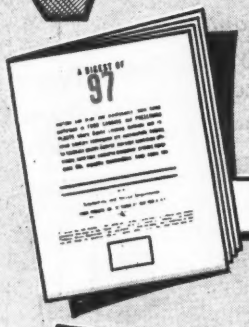
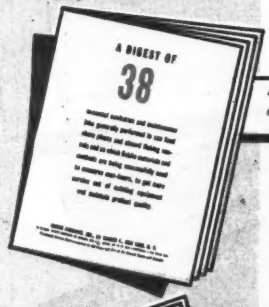


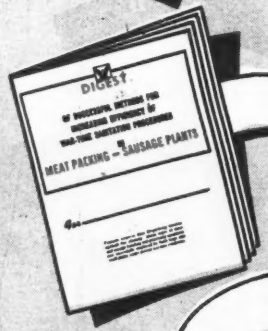
1. FOOD CANNING DIGEST

24 pages outline specific data on 97 different cleaning, sanitizing, de-scaling, rust removal and related tasks. A helpful guide in safeguarding product quality . . . extending useful life of processing and handling equipment.



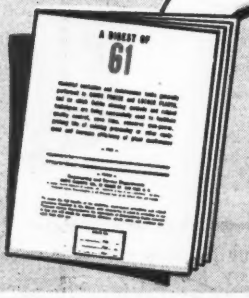
2. FISH CANNING DIGEST

Contains 8 pages of data on economical methods for keeping all fish processing and handling equipment in sanitary condition. Describes methods for safely cleaning over 38 different types of aluminum, galvanized, stainless steel, tinned and Monel equipment. All fish canners, processers, filleters and fleet operators should have a copy.



3. MEAT PACKING DIGEST

Prepared for meat packing and sausage plant superintendents. Concisely reviews from "A" to "Z" widely used, safe methods for handling over 58 essential plant sanitation and equipment maintenance jobs. 17 pages.



4. QUICK FREEZE & LOCKER PLANTS

This 12-page Digest gives time-saving tips on 61 different, commonly recurring sanitation and maintenance tasks. Describes performance-proved procedures for cleaning processing and plant equipment of all types.

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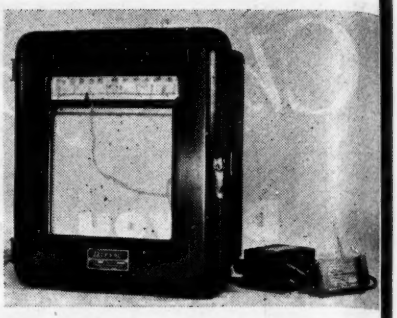


Type "MR" vacuum recorder.

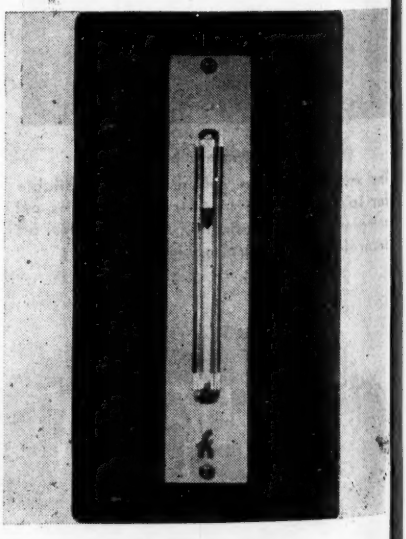
are interchangeable without recalibration. The gage is supplied with a special Micromax strip chart recorder calibrated directly in microns.

The other new instrument is the type "S" recorder for ultra vacuum. It has two ranges. For pressures above one micron, it utilizes the new 0 to 500 micron thermal gage. For the range of 0 to 0.4 microns, it uses an industrial type ionization gage. Accurate readings may be obtained down to 0.001 micron.

This type instrument also features a safety circuit which makes it impossible to turn on the ionization gage until a vacuum of one micron has been reached. Average life of ionization gage is said to be 3,000 hours.

Panel-Mounted Rotameter

A PANEL-MOUNTED Rotameter is offered by Schutte & Koerting Co., 1150 N. 12th St., Philadelphia 22. The mounting has a frosted-glass window with a central clear-glass aperture and is installed flush in the panelboard, with the instrument supported directly behind. Provision is made for adequate backlighting and ready maintenance accessibility.



Panel-mounted Rotameter.

FRESH FOODS EVERYWHERE

Markets for Perishable Foods are no Longer Limited by Transportation

The fact that the bulk of the population of the United States lives in communities too small to be served by refrigerated cars has meant that transportation schedules really limit markets.

Today, however, as fast as Church Containers are released from handling blood plasma, vaccines, etc. for the Army and Navy they will go into widening the markets for processors of perishable foods.

In war work the Church Container formed the basis of the modern technique of fast refrigerated delivery to every point touched by Railway Express.

Each container provides 10 cubic feet of cargo space for high-profit perishables and the details of delivery, collection and return of the container are taken over by the Railway Express Agency. In that way the Church Container imposes no detail work on shipper or store. Here then is a quick, economical method for transporting meats, poultry, seafoods and other perishables from point of production to point of sale—in a thoroughly efficient manner.

To help you study the application of Church Containers in enlarging your sales territories, your local Railway Express Agency will furnish you full details of the operation.

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held to a three degree rise in temperature per day

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RAILWAY EXPRESS AGENCY

making door to door delivery of perishable foods

to

23,000 OUTLETS IN THE U.S.

that are reached by fast express.

"ENTOLETER" PROTECTS QUALITY STANDARDS

PROTECT
YOUR PRODUCTS
WITH
THIS MODERN
INSECT
CONTROL

While all good housekeeping practices are important, the final *essential* safeguard is to make certain that no insect life is present in raw materials, in blending stocks and in the finished product before packaging. This calls for *continuous* control, applied as part of the processing operation.

That is why many food processors are extending "ENTOLETER" Continuous Insect Control throughout their plants. The remarkable benefits obtained through the operation of one or two "ENTOLETERS" in a mill are the most compelling reason for extending this protection to treat all free-flowing dry materials that may be endangered by infestation. Write today for bulletin, describing "ENTOLETER" applications. Entoleter Division, The Safety Car Heating and Lighting Company, Inc., P.O. Box 904, New Haven, Connecticut.

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INFESTATION DESTROYER
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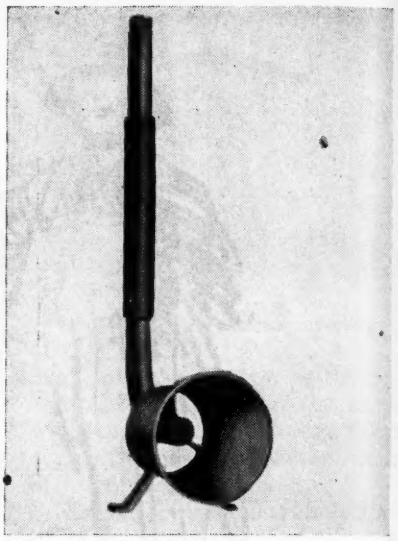
CONTINUOUS DESTRUCTION OF ALL INSECT LIFE



Jet-type mixer.

Jet-Type Mixer

UTILIZING steam, air or solution to thoroughly agitate and circulate solutions in tanks and vats, a jet type mixer has been designed and built by the Youngstown Welding & Engineering Co., Youngstown, Ohio. By installing this jet in a corner, or along the sides of tank, it is claimed that an entire tankful of liquid can be agitated and mixed at the same time. It can be connected to an existing line, no special piping being necessary.

The velocity of the air, liquid or steam increases as it passes through the special nozzle and expands into the bell-shaped housing of the jet. The action sucks solution from the tank through the back of the jet so that the solution at the side and back of the jet is agitated and circulated as well as in the solution in all other parts of the tank. The unit can be made of corrosion-resisting metals as desired.

Electro-magnet

BINGS MAGNETIC SEPARATOR CO., 509 E. Smith St., Milwaukee 7, Wis., announces an electromagnet for chutes for the elimination of tramp iron. Particles of iron are attracted to a step in the face of a double-gap, high-intensity magnet so as not to be knocked off by the flow of material. When material and current are shut off, the safety gate rises automatically to discharge any accumulation of iron. In the event of current interruption while the material is still flowing, the safety gate automatically discharges the entire flow until the process can be shut down and current restored.

CATALOGS, BULLETINS

FOOD PLANT EQUIPMENT

Grease Interception—"Manual A" is a new publication issued by the Josam Manufacturing Co., 373 Empire Bldg., Cleveland, covering the subject of grease interception. It offers handy selection charts, description of three different types of float controls, and prints of actual installations, which demonstrate in detail the proper relation of sink, interceptor and float control.

Refrigerated Food Locker Plants—The Frick Co. Inc., Waynesboro, Pa., has just issued an 8-page informative booklet covering refrigerated food locker plants. Its illustrations include a typical plant arrangement. The booklet also gives considerable detailed information on plant operation.

Processing Equipment—General Bulletin G-45 has just been issued by the Stacey Bros. Gas Construction Co., Cincinnati, in which is given a comprehensive picture of the fabrication and erection of gas-holders, processing vessels and other structures. In this 44-page bulletin the company's production and erection facilities are shown in action. It also illustrates many of the products and processing equipment in process of being built.

Spreader Stokers—Johnston & Jennings Co., Cleveland 14, has issued a 4-page bulletin describing its new spreader-type stoker.

Attrition Mill—In a 4-page pamphlet, the International Ore Corp., 500 Fifth Ave., New York 18, describes its attrition mill, which has been found suitable for grinding many food items, including mixtures of cocoa and sugar, down to one micron size. It is said that, after grinding, the material will stay in suspension indefinitely.

Multistage Pump—A vertical multistage pump, designed for handling liquids where the net positive suction head is limited, is described in a new 8-page bulletin issued by the Byron Jackson Co., 2017 Terminal Annex, Los Angeles, Calif. The bulletin contains descriptions and illustrations of installations. Specifications and dimensions are given.

Pump Valves—Describing "a pump valve with a thousand seats" is a 4-page bulletin, in color, issued by the Madsen Iron Works, Huntington Park, Calif. By means of cut-away drawings and sketches, the operation of this pump valve is vividly illustrated. The ball valve and ball stem are machined with a common center. Valve and seat are separately ground and lapped together. The ball valve revolves so that each turn or swing of the valve produces a new seat.

Fabricating Films and Foils—Converting and fabricating of films and foils is discussed and illustrated in a 16-page booklet, Applied Magic, issued by Dobeckmun Co., 3301 Monroe Ave., Cleveland 13, Ohio.

Care of Heat Exchangers—A new 10-page booklet, Care and Handling of Heat Exchangers, has just been published by Whitlock Mfg. Co., Hartford 1, Conn. The booklet gives pointers on proper and improper installation of heat exchangers and on their operation and maintenance. It gives detailed suggestions as to the correct way of cleaning.

PLANT SUPPLIES

Frozen Food Container—A 4-page bulletin has just been issued by Container Corp. of America, 1301 W. 35th St., Chicago 9, which describes and illustrates a container for merchandising frozen foods.

Decalcomanias—The Palm Bros. Decalcomania Co., Cincinnati 12, has just issued an attractive 8-page bulletin, in color, illustrating a number of typical decalcomanias produced by the company.

1-Sorbose—A bulletin explaining the composition, derivatives, properties and uses of l-Sorbose, together with references to literature on this product, has been prepared by Schwarz Laboratories, Inc., 202 East 44th St., New York 17. The many uses of this hexose make the bulletin of special interest to manufacturers of vitamins and dietary products, and those interested in the general field of carbohydrate chemistry.

Color Selection—This is a new color-selection guide which permits persons, without detailed technical knowledge of color science, to specify correct color shades that minimize fatigue and promote safety. It is offered by Arco Co., Cleveland.

Lubricant-Retaining Bearings—Great engineering flexibility in the selection of bearing sizes, in standard shapes and in various powdered metal materials, is made possible by a new 20-page booklet, issued by the Bound Brook Oil-Less Bearing Co., Bound Brook, N. J. Literally hundreds of thousands of parts can be specified. In addition to tabulations of graduated dimensions, segregated for quick

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INSTALL
BUMP PUMPS
With fewest parts possible Bump Sanitary Pumps are easy to clean and maintain. There are no packing, no grease cups, no internal threads — only two moving parts. The liquid being pumped cannot be contaminated as the bearings are entirely separate from the pumping chamber, thus guaranteeing protection of quality. Bump Pumps are 100% sanitary. Available in capacities from ½ to 300 GPM.
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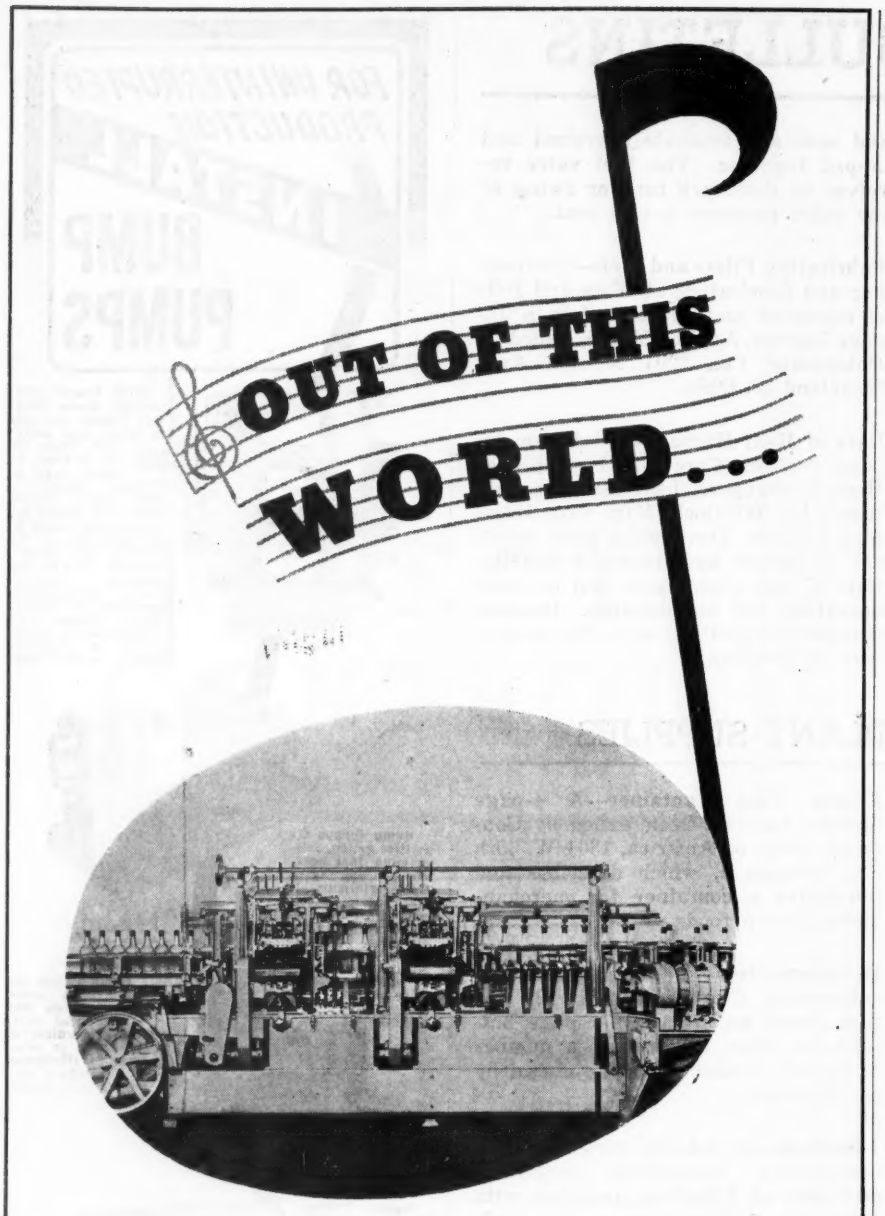

and hundreds more like it, come countless thousands of neatly, smoothly, accurately labeled glass packed foods, preserves, condiments and beverages. WORLD BEE-LINE Labelers sound exactly the right note for efficient, dependable production. They are helping many important food processors to make the best of today's lack of skilled help combined with extraordinary demand. Wherever they swing into action, WORLD Labelers are providing greater harmony and eliminating sour notes in the scale of production.

WORLD BEE-LINE Labelers are ready to meet the better and brighter years that lie ahead for you. Now is the time to let us send you the whole story.

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ECONOMIC MACHINERY COMPANY

Builders of World Automatic and Semi-Automatic Labelers for Every Purpose

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New York Philadelphia Pittsburgh Chicago San Francisco Denver Louisville Salt Lake City El Paso Seattle Portland Phoenix London Montreal Toronto Winnipeg Spokane Vancouver Mexico City Sydney, Australia Wellington, N.Z. San Juan, P.R. Ciudad Trujillo, D.R.

reference on sleeve-type and flanged bearings, other data on self-aligning bearings, thrust washers, bar stock and special shapes are included.

Industrial Wire Cloth—Catalog No. 12, containing 56 pages of data on industrial wire cloth has just been published by Buffalo Wire Works Co., Inc., 452 Terrace, Buffalo 2. It is an excellent reference book. Tables on all mesh sizes facilitate both specifying and purchasing, while simple formulas permit users to work out their own measurements of open area, width of opening, weights, and so forth.

Wire Belt Hooks — The Bristol Co., Waterbury 91, Conn., has just announced the publication of a bulletin describing its new line of wire-belt hooks for all types of flat belting. The bulletin is liberally illustrated to show method of applying hooks to belts. Specification information and prices are also given.

Plastic Film — Firestone Industrial Products Co., Akron, Ohio, has just issued a 20-page catalog, in color, illustrating numerous applications of its plastic film material. It gives a detailed list of properties, which include low moisture and vapor transmission, flexibility, elasticity, toughness and resistance to scuffing, bending and tearing. It is said to be odorless, tasteless, insoluble in water, food acids or ordinary oils and greases, and does not mildew.

V-Belts—New catalog sections, on its fractional horsepower and multi-V-belts, have been published by B. F. Goodrich Co., Akron, Ohio. They are available upon request. The sections describe construction of the company's belts and list standard belt dimensions and interchangeability tables.

CONTROL EQUIPMENT

Electric Timer—C. H. Stoelting Co., 424-P North Homan Ave., Chicago 24, has published a 4-page bulletin describing electric timers having wide application in industrial and laboratory testing. Described in the bulletin are table and wall model stop clocks, combination timers and impulse counters, stopwatch controllers, and spring-wound x-ray timers. Circuit diagrams are included to show correct methods of connecting the various timers in test circuits.

Electronic Thermometers — Bulletin No. 230-A has been published by Bailey Meter Co., Cleveland 10, Ohio. It features electronic resistance thermometers in indicating, recording and controlling models for temperature ranges between the limits of minus

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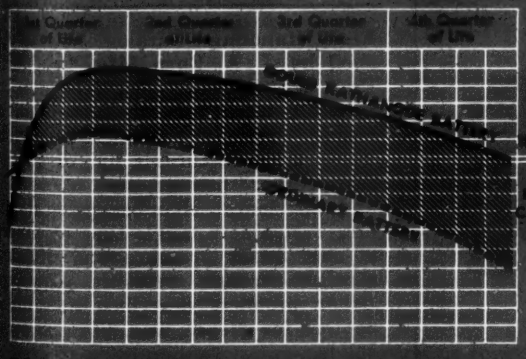
PAYS DIVIDENDS *in extra materials handled*

The shaded area in the graph below shows the *excess capacity* of the Kathanode battery. From beginning to end of service life it is greater than that of ordinary batteries.

With the minimum of catalog rated capacity available at all times throughout the life of Kathanode, your trucks will run with undiminished speed throughout their daily shift, during the full span of their battery life.

Costly delays due to changing of batteries during shifts, because of premature reduction of capacity, is avoided when you use Kathanode batteries.

For industrial trucks battery power is best and Kathanode is the best battery power. Write Dept. 67 for Catalog 100 on Gould Kathanode Glassklad Batteries for Industrial Truck and Tractor Service.



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The large factor of safety and high heat transfer rate characteristic of small, compact, light weight "BCF" Coolers place them in a class by themselves. The most tangible evidence of this is their use by over 81% of the Diesel Engine builders.

For a small unit fulfilling almost *any heat exchange requirements*—

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★ Easily inspected, cleaned and maintained

★ Capable of accommodating practically every piping layout

. . . consult a Ross heat exchange engineer about Type "BCF"

Details of design and construction graphically presented in *BULLETIN 4922*, sent free on request.

ROSS HEATER & MFG. CO., Inc.

Division of American Radiator & Standard Sanitary Corporation

1443 WEST AVENUE BUFFALO 13, N. Y.

100 deg. F. and plus 1,200 deg. F. This 12-page bulletin lists outstanding features, describes the electronic detector and motor control, gives definite information on ranges, power supply required, speed of response, accuracy, sensitivity, installation, standard chart ranges and automatic control application.

Rotameters — The Cochrane Corp., Philadelphia 32, has issued a 16-page booklet on Rotameters. It gives specific gravities of gases and of various metals used in floats, together with formulas for converting water and air capacities to terms of other liquids and gases. Other selection factors, such as pressure drop, length of scale and float material are covered in this publication, No. R-100A.

Liquid-level Controls—A 30-page catalog explaining the principle and operation of the floatless liquid level control has been issued by the B/W Controller Corp., 2200 East Maple Road, Birmingham, Mich.

System for Freezing Temperature—Kramer Trenton Co., Trenton 5, N. J., has just issued a 6-page bulletin describing their completely automatic system for freezing temperatures. The system is described and illustrated in detail.

Electronic Equipment—Walker-Jimieson, Inc., 309 S. Western Ave., Chicago 12, has published a new catalog of radio and electronic equipment.

FOOD PLANT EQUIPMENT

Fluid Handling—Catalog No. 45, issued by J. A. Zurn Mfg. Co., Erie, Pa., describes a complete line of tested devices for the protection of piping systems that handle fluids. The catalog features a line of suction and pressure fittings, such as vertical and horizontal chamber-type strainers, Y-strainers, angle-type strainers, 90-deg. offset pressure and 180-deg. straight-through pressure strainers. Other products described are interceptors for grease, wax, lint and other solids.

Material Handling Equipment—Lyon-Raymond Corp., 2193 Madison St., Greene, N. Y., has published a condensed circular, No. 139, covering hydraulically operated materials handling equipment.

Coal and Ash Handling—Jeffrey Mfg. Co., Columbus 16, Ohio, has just published a generously illustrated 60-page booklet describing numerous units for handling coal and ashes. It demonstrates how the various units can be combined to meet any plant layout or capacity. A number of typical layouts are also shown.

Rely on National . . . with its expert knowledge of the mechanical and chemical requirements of each adhesive application . . . to provide trouble-free operation at high speeds.

What are the clean machining qualities of an adhesive? Many. Very many. When rapidly rotating rollers have a churning action, the adhesive must be non-foaming. When exposed to air, it must not skin over . . . must not crystallize so rapidly that it builds up on glue pots, brushes, wheels . . . must not corrode metal or harden rubber parts . . . must not break down under continuous agitation or coagulate in the machine or during normal periods of storage.

In all transfer and stencil applications of glue, the adhesive must be non-stringy so as to break short and clean; and must be non-creeping to adhere strictly to the stencil pattern. At high speeds, the adhesive must neither throw from the applicator nor spatter the work in any way to cause labels or cartons to 'lock' . . . and interfere with subsequent pick-up, folding and filling operations of labeling, envelope making, bag sealing, carton filling, etc.

You can safely rely on National . . . with its practical background of adhesive applications . . . to provide the clean machining qualities needed to handle your specific job *efficiently* at its highest level of production.

Offices: 270 Madison Avenue, New York 16; 3641 So. Washtenaw Avenue, Chicago 32; 735 Battery Street, San Francisco 11, and other principal cities.

National ADHESIVES

EVERY TYPE OF ADHESIVE FOR EVERY TYPE OF ADHESION

Letters to the Editor

Sweet Wrinkled Peas Are Plentiful

To the Editor
of Food Industries:

E. C. Crocker's article in the March, 1945, issue of FOOD INDUSTRIES is interesting and timely, in that it presents a viewpoint on food processing that too frequently has been overlooked in the past.

Attention is drawn to the author's statement that "The best varieties of foods for good flavor after processing are not always the ones easiest to raise, because of plant diseases, unevenness of ripening of the crop, low yield or other agricultural considerations. Varieties that yield inferior flavor on processing are all that are available to most food processors who do not raise their own. Peas illustrate this matter conspicuously. Only the relatively flavorless smooth Alaska pea is commercially available. There is no commercial supply of the sweet wrinkled type, which is the pride of the home gardener."

The above statement is not in keeping with the facts as regards either canned or frozen peas. The following tabulation records the number of cases of the Alaska and sweet wrinkled varieties that were canned in three years.

Year	Alaska	Sweet wrinkled
1941	10,904,716	18,112,823
1942	12,668,907	22,183,744
1943	14,958,311	18,868,257

It will be noted that in each year the number of cases of the sweet wrinkled variety packed considerably exceeds the number of cases of the Alaska variety. The Alaska variety predominates in those states located on the southern edge of the pea producing area, namely, Illinois, Ohio, Indiana, Delaware and Maryland. On the other hand, the sweet wrinkled variety predominates in the large pea producing states such as Washington, Oregon, Wisconsin and New York. The Alaska variety matures early and makes it possible to prolong the period at which peas can be harvested at optimum maturity. While this must be recognized as one factor in the use of the Alaska variety, the fact remains that there are some markets that seem to prefer this variety over the sweet wrinkled variety. Since judgment of flavor is entirely sensory in nature, it is not to be expected that all individuals will react the same to a given combination of flavors.—ROGER H. LUECK, *Manager of Sales, American Can Co., Pacific Division, San Francisco, Calif.*

Author's Reply

The statement about the flavors of smooth Alaska peas and wrinkled peas was made as the result of personal experience and reaction. The wrinkled peas, to my taste, are far sweeter and more tender. My inability to get commercial supplies of these peas in dried powdered form at the time when it was strongly desired for research purposes prompted the remark about their unavailability. This observation as published was poorly phrased, to say the least, and appeared to apply to all supplies of wrinkled peas. Curiously, prepublication review of the article by several authorities in the food industry failed to catch this obvious misstatement. As Mr. Lueck's figures indicate, canned and frozen wrinkled peas have, of course, been available in large quantities.—ERNEST C. CROCKER, *Arthur D. Little, Inc., Cambridge, Mass.*

A SPOT for Processors of FROZEN Sea-Food

To the FROZEN FOOD INDUSTRY, Panama City, Florida, offers a potential catch of 11,000,000 lbs. annually. Red Snapper, Blue Fish, Sea Trout, Bass, Grouper and Mackerel and other types suitable for frozen food, predominate. U. S. Dept. of the Interior confirms these statistics.

A substantial fishing fleet provides a dependable source of supply. It has sailed out of Panama City for more than 60 years. The proximity of Panama City to large consumer markets, is apparent, when you apply a compass to the map of Florida and Georgia.

The City's financial status is best described by stating that its bonds are selling on the exchanges at 109½.

Write for full Information.

J. M. Rainey, Mgr.
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BOOKS

Meat Technology

MICROBIOLOGY OF MEATS, Second Edition. By L. D. Jensen. Published by The Garrard Press, Champaign, Ill., 1945, 389 pages; 6¼x9¼ in.; cloth. Price, $5.50.

In this new edition of a book first published in 1942, several new sections have been added on such subjects as bacterial spores, beef, dehydration, smoking of meats, bacteriology of ice, the action of salt, nitrate and nitrite on bacteria, as well as the control of bacteria.

These additions, along with the original work, offer a well-organized study of the relationship of microorganisms to agriculture and food technology. As in the first edition, the presentation of data is through flowsheets of practical meat operations.

G. I. Laws

VETERAN LAW MANUAL. Published by Commerce Clearing House, Inc., 214 N. Michigan Ave., Chicago 1, 271 pages; 6x9 in.; paper. Price, $2.

While most industrialists are anxious to do a great deal more for our war veterans than the law requires, most management heads will find it to their advantage to know just what the law does require in a given case. These requirements extend far beyond the so-called "G. I. Bill of Rights."

This volume brings together all the laws relating to veterans and covers such contingencies as business and farm loans, mortgages, hospital care, and so on. The business executive will find it a handy reference manual to keep within reach during the next several years.

Brewing by Experts

BREWING MATERIALS. By Arnold Spencer Wahl. Published by Wahl Institute, Inc., 53 West Jackson Blvd., Chicago, 1944, 623 pages; 5⅜x8¾ in.; fabrikoid. Price, $12.

This is the second of a four-volume Wahl Handybook of the American Brewing Industry. Volume I, "Beer From the Expert's Viewpoint," was published in 1937.

Of its six parts, two are devoted to malting processes and malt adjuncts and contain information of wide potential interest throughout the food processing industry. European and modern malting systems are discussed, along with floor, pneumatic and special malting methods. Equipment as well as procedures and composition are dealt with.

The chapters entitled "Barley," "Malt," "Hops" and "Technical Materials for Brewing" apply specifically to makers of beer and other cereal beverages.

For bottlers, the chapter dealing with bottle cleaning practice and materials could be more complete. Although helpful information is given on bottle cleaning materials, the methods and mechanical means by which bottles may be cleaned properly are dismissed with the recommendation that bottle shop foremen consult with specialists supplying bottle cleaning materials.

Much of the contents of Vol. II, like Vol. I, are based on personal viewpoints of the author and studies carried on by Wahl Institute, Inc.

Although water and yeast are obviously among the materials used in brewing, treatment of them is deferred to Vol. III on beer production.

Food and Peace

THE RECONSTRUCTION OF WORLD AGRICULTURE. By Karl Brandt. Published by W. W. Norton & Co., Inc., 70 Fifth Ave., New York 11, 1945. 416 pages; 5½x9¾ in.; cloth. Price, $4.

The world's agriculture has been badly disrupted during the past six years. Not only has the war disorganized the flow of farm products, but it has created an enormous demand for food and brought unprecedented prosperity to many, if not most, of the world's 1⅓ billion farmers. Whether these favorable conditions can be continued in peacetime is one of the basic discussions of this latest book by the former German economist, who is now professor of agricultural economics at Food Research Institute, Stanford University.

The book opens with a discussion of the effects of World War I upon agriculture throughout the world. It carries through the 1920's and the 1930's, establishing a historical economic foundation for the consideration of the even greater farm problems of the present and immediate future. And then, of course, the impact of the present war and all the ramifications to be expected in its wake are discussed.

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written study, most readers will have little difficulty in accepting the author's statement that "this book concerns one important aspect of the great challenge of our time—how shall a more durable and vital peace be built?"

GOVERNMENT PUBLICATIONS

COMPREHENSIVE EXPORT SCHEDULE NUMBER 17. Foreign Economic Administration. Available from Superintendent of Documents, Washington 25, D. C. Price 50 cents. Includes information and restrictions for handling all exports which must go out under export business.

INSECTICIDES AND EQUIPMENT FOR CONTROLLING INSECTS ON FRUITS AND VEGETABLES. By N. F. Howard and C. A. Weigel. Department of Agriculture, Miscellaneous Publication No. 526. Available from Superintendent of Documents, Washington 25, D. C. Price, 15 cents.

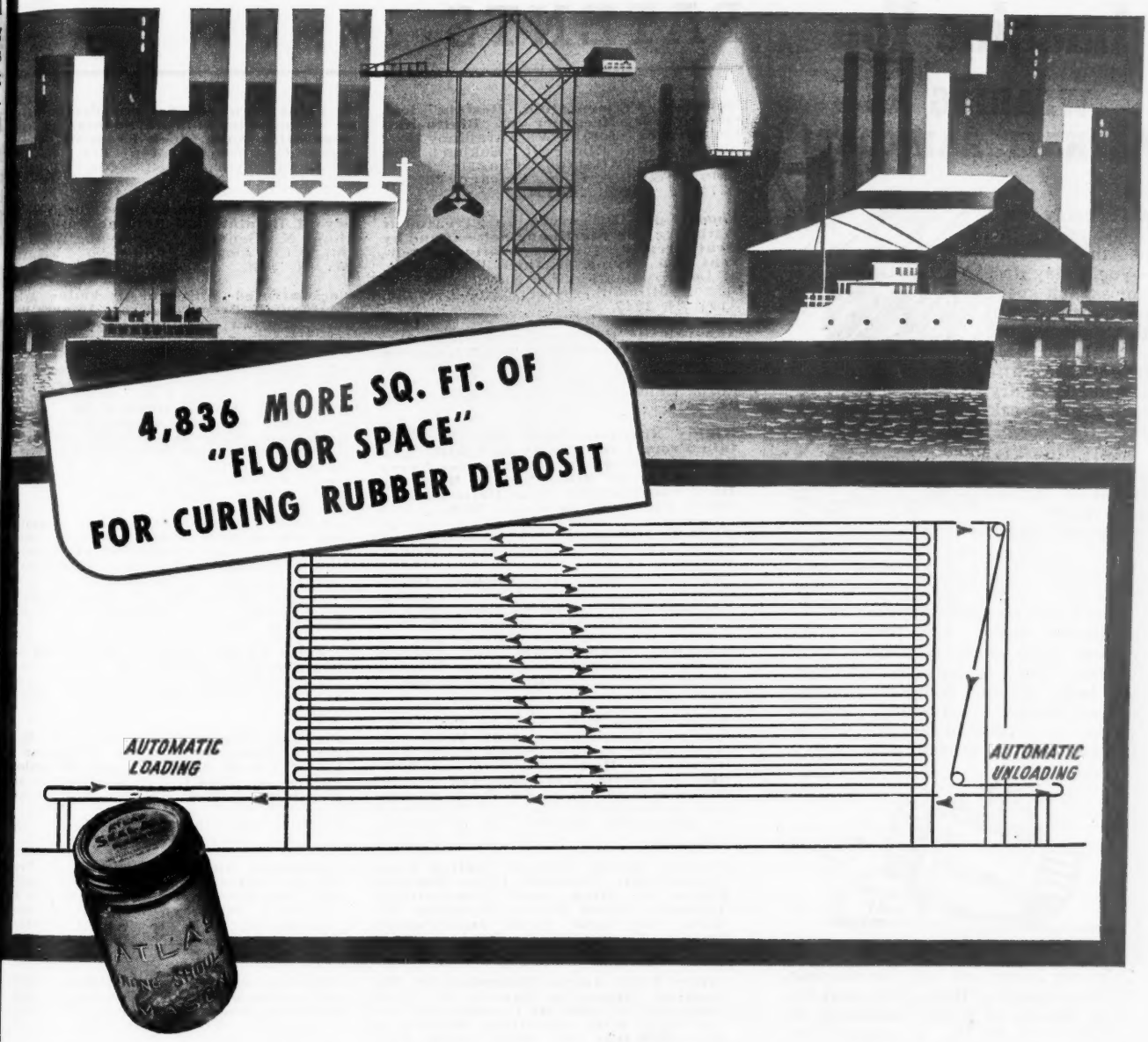
REPORT OF THE ADMINISTRATION OF AGRICULTURE RESEARCH 1944. Agricultural Research Administration. Available from Superintendent of Documents, Washington 25, D. C. Price 25 cents. Includes reports of all of the career research bureaus of the Department of Agriculture.

QUALITY CHARACTERISTICS OF WHEAT VARIETIES GROWN IN THE WESTERN UNITED STATES. By C. C. Fifield, and others. Department of Agriculture, Technical Bulletin No. 887. Available from Superintendent of Documents, Washington 25, D. C. Price, 10 cents.

LISTS OF PUBLICATIONS AND PATENTS OF BUREAU OF AGRICULTURAL AND INDUSTRIAL CHEMISTRY. Department of Agriculture, AIC-69. Available on request to Bureau of Agricultural and Industrial Chemistry, Washington 25, D. C. It covers publications and patents issued during the fiscal year ending June 30, 1944.

FOOD CONSUMPTION LEVELS. War Food Administration. Available from Superintendent of Documents, Washington 25, D. C. Unnumbered pamphlet. Price 10 cents. A joint statement for United States, Canada, and United Kingdom in a second report of Combined Food Board giving a detailed summary of per capita consumption for many individual foods.

TESTING OF WEIGHING EQUIPMENT. By Ralph W. Smith. Bureau of Standards, Handbook H-37. Available from Superintendent of Documents, Washington 25, D. C. Price, 75 cents. A manual of fundamental principles of weighing and the testing of equipment.



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DIAMOND CRYSTAL
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PATENTS

Molasses Fermentation Residue Extracted for Recovery of Biotin-like Constituent—Joseph V. Karabinos, Columbus, and Elmer R. Eckhart and Wilbur I. Patterson, Chagrin Falls, Ohio, to S. M. A. Corp., Chicago, Ill. No. 2,374,212. April 24, 1945.

Food Juice Preserved by Treatment With Organic Sterilizing Solvent and by Heat Treating for Evaporation of Solvent and Drying of Juice—Royal Lee, to Lee Foundation for Nutritional Research. Milwaukee, Wis. No. 2,374,219. April 24, 1945.

Non-volatile Fatty Material Steam Deodorized in Presence of Small Quantity of Gum Guaiac—Guy W. Phelps and Howard C. Black, to Industrial Patents Corp., Chicago, Ill. No. 2,374,234. April 24, 1945.

Highly Nutritive Food Made To Contain From 1 to 3 Parts of Cystine and 0.2 to 1 Part of Tryptophane for Every 100 Parts of Milk Protein Mixed to Have Substantially Same Ratio to Each Other as Found in Cow's Milk—Richard J. Block, Scarsdale, and Arthur P. Hellwig, Hartsdale, N. Y., to C. M. Armstrong, Inc. No. 2,374,407. April 24, 1945.

Vegetables and Like Cooked, Dehydrated and Cooled While Passing Through Unit Consisting Essentially of Cylindrical Rotating Drum With Perforated Wall Through Which Circulate Cooking, Dehydrating and Cooling Media—Harmannus Karel de Weerth, Buenos Aires, Argentina. No. 2,374,425. April 24, 1945.

Homogenized Milk Made by Pasteurizing and Neutralizing Milk With Calcium Oxide or Magnesium Oxide Preliminary to Homogenization and Addition of Lactic Acid-producing Starter and Cooling—Ernest D. Fear, 30 Percent to Irving E. Fear and 20 Percent to Helendoris Murphy, all of Kansas City, Mo. No. 2,374,427. April 24, 1945.

Freshly Killed Dressed Poultry Compressed Into Compact Form Between Plates of High Heat Conductivity, Through Which Flows Freezing Medium, and Held Until Substantially Frozen—Harry A. Noyes, Newton, Mass. No. 2,374,452. April 24, 1945.

Citrus Fruit Juices Expressed by Mechanical Means in Manner To Avoid Cracking of Seeds or Crushing of Peel and Rag With Resulting Release of Essential Oils and Other Bitter Constituents—Eric Ravndal and Alexander P. Fothergill, Orlando, Fla., three-fourths to Ravndal and one-fourth to Fothergill. No. 2,374,456. April 24, 1945.

Peas and Beans Shelled by Mechanical Means—Horace Zell Stewart, Mobile, Ala. No. 2,374,466. April 24, 1945.

Eggs in Small Lots Washed by Mechanical Means—Walter J. Reading, Buffalo, N. Y. No. 2,374,500. April 24, 1945.

Riboflavin Biologically Produced by Growing Fungus on Carbohydrate-free Nutrient Mash Containing Metabolizable Lipid and 10 to 90 Percent Proteinaceous Material—Frank J. Rudert, to Commercial Solvents Corp., Terre Haute, Ind. No. 2,374,503. April 24, 1945.

Foods Containing Fermentable Ingredients Stabilized Against Undesired Fermentation and Bacterial Decomposition by Treatment With Monohalogen-Acetic Acid Esters of Monohydroxy Aliphatic Carboxylic Acid. Monohalogen-Acetic Acid Esters of Polyhydroxy Aliphatic Carboxylic Acid and Mixtures of Such Esters—Martin V. H. Prinz, Omaha, Neb. No. 2,374,620. April 24, 1945.

Casein and Soya Protein Plasticized by Treatment of Glycerol, Formamide and Derivatives — Charles Dangelmaier, Nutley, N. J. No. 2,374,667. May 1, 1945.

Animal and Vegetable Oils Refined by Neutralizing Free Fatty Acid Content in Presence of Oil Solvent Preliminary to Vaporizing Volatile Substances and Separating Soap Stock From Oil—Benjamin Clayton, Houston, Tex., to Refining, Unincorporated. No. 2,374,924. May 1, 1945.

Sugar Beet Wastes Treated for Recovery of Betaine and Betaine Salts—Arthur N. Bennett, to Great Western Sugar Co., Denver, Colo. No. 2,375,164. May 1, 1945.

Concentrated Solution of Amino Acid Compounds Prepared From Impure Dilute Solution Obtained From Processing Protein-containing Organic Matter—Alpheus R. Nees and Arthur N. Bennett, to Great Western Sugar Co., Denver, Colo. No. 2,375,165. May 1, 1945.

Raw Fish Livers Ground and Mixed With Dry Finely Ground Hydrophilic Vegetable Material to Give Dry Vitamin Food Product Devoid of Oiliness—Loran O. Buxton, Newark, N. J., to National Oil Products Co., Harrison, N. J. No. 2,375,278. May 8, 1945.

Oil-free Vegetable Particles Containing Fat-soluble Vitamin Given Outer Protective Coat Composed of Gelatine and Vegetable Hydrophilic Substance—Loran O. Buxton, Newark, and Andre E. Briod, Short Hills, N. J., to National Oil Products Co., Harrison, N. J., No. 2,375,279. May 8, 1945.

Fruit To Be Pitted Held, Lifted and Positioned by Mechanical Means—Burton C. Coons, to Food Machinery Corp., San Jose, Calif. No. 2,375,350. May 8, 1945.

Pectinous Material Extracted by Making Aqueous Dispersion, Adjusting to pH of 2 to 4, Adding Alkali Metaphosphates of Alkali Polyphosphates and Heating—William Dayton Maclay and John P. Nielsen, Berkeley, Calif., to U. S. A. Secretary of Agricuture. No. 2,375,376. May 8, 1945.

Macerated Animal Livers Freed From Water Extractives Made Into Edible Dry Powder Giving Highly Stable Vitamin A Potency—Boris T. Sokoloff, Bloomfield, N. J., to World Products Corp., New York, N. Y. No. 2,375,501. May 8, 1945.

Gas Incorporated Into Flowing Stream of Unfrozen Milk by Aspirating Action to Form Food Foam—Radcliffe Morris Urquhart. Montgomeryville, Pa. No. 2,375,833. May 15, 1945.

Leafy Portion of Cereal Grass Processed for Use as Base for Brewed Potable Beverage—William R. Graham, Jr. Kansas City, Kans., and Elroy E. Frye, Kansas City, Mo., to American Dairies, Inc., Kansas City, Mo., and Quaker Oats Co., Chicago, Ill. No. 2,376,049. My 15, 1945.

Butter Mechanically Wrapped by Package-forming Unit—Lowell R. Newton, to Industrial Patents Corp., Chicago, Ill. No. 2,376,076. May 15, 1945.

Cranberries Picked by Mechanical Means—Arthur M. Lobdell, Plympton, Mass., to Shaer and Turner Engineering Co., Inc., Boston, Mass. No. 2,376,260. May 15, 1945.

Granular Bouillon Made From Hydrolyzed Glue and Hydrolyzed Protein—Siegwart Hermann and Marianne Hermann Hahn, New York, and Herbert H. Dorer, New Brunswick, N. J., to Verona Chemical Co., Newark, N. J. No. 2,376,485. May 22, 1945.

Granular Bouillon Made from Hydrolyzed and Neutralized Glue and Hydrolyzed Yeast—Siegwart Hermann and Marianne Hermann Hahn, New York, N. Y., and Herbert H. Dorer, New Brunswick, N. J., to Verona Chemical Co., Newark, N. J. No. 2,376,486. May 22, 1945.

Peaches Mechanically Pitted in Continuous Manner—Albert R. Thompson, San Jose, Calif., to Pacific Machinery Co., San Francisco, Calif. No. 2,376,526. May 22, 1945.

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Oilseeds, Treated With Morpholine to Raise pH, Stored for at Least One Week and Extracted to Obtain Oil Considerably Lightened in Color—Aaron M. Altschul and Melvin L. Karon, New Orleans, La., to Secretary of Agriculture, U. S. A. Nos. 2,376,568 and 2,376,852. May 22, 1945.

Perishable Foodstuffs Packaged in Stretchable Material Which Contracts When Heated and Retains Skin-tight Contact With Contents During Refrigeration—Henri Marie Joseph Tyrel de Poix, Rueil, France, to Dewey and Almy Chemical Co., Cambridge, Mass. No. 2,376,583. May 22, 1945.

Fruit Cleaned by Combination Action of Lower and Upper Rows of Rotary Brushes—Sanford Diller, Benton Harbor, Mich. No. 2,376,587. May 22, 1945.

Finely Ground Gum Solids Made Dispersable in Water by Being Intimately Mixed with Water-soluble Lactate Salt—Ben F. Buchanan, Leonia, N. J., to American Maize-Products Co. No. 2,376,656. May 22, 1945.

Soft-curd Milk Prepared So As Not To Flake or Curdle When Brought To Boiling Temperature, To Be Free of Cooked Flavor and To Have Well-defined Cream Line—Raymond G. Helmer and Merle G. Farnham, Milwaukee, Wis., to Chr. Hansen's Laboratory, Inc., Little Falls, N. Y. No. 2,376,693. May 22, 1945.

Edibles Sliced During Passage Through Trough Fitted With Plurality of Vertically Taut Wires—Henry G. W. Young, Cambridge, Mass. No. 2,376,843. May 22, 1945.

Crystalline Rennin Prepared From Rennin Extract—Cloyce L. Hankinson, Milwaukee, Wis., to Carnation Co., Oconomowoc, Wis. No. 2,376,848. May 22, 1945.

Fat Stabilized Against Rancidity by Addition of p-Aminobenzoic Acid and Compound With Ene-Diol Grouping—Frank A. Norris, Minneapolis, Minn., to General Mills, Inc. No. 2,377,029. May 29, 1945.

Fat Given Antioxidant Properties Through Compound Having Ene-Diol Grouping and Compound Selected From Morpholine, Mono-, Di-, and Triethanolamines—Frank A. Norris, Minneapolis, Minn., to General Mills, Inc. No. 2,377,030. May 29, 1945.

Fat Stabilized Against Development of Rancidity by Addition of Compound Containing Ene-Diol Group, p-Aminobenzoic Acid and Compound Selected From Group Consisting of Chroman-5, 6-Quinones, Hydroxychromans, Hydrochromenes, Hydroxycoumarans and Hydroxycoumarones—Frank A. Norris, Minneapolis, Minn., to General Mills, Inc. No. 2,377,031. May 29, 1945.

Zein Dispersed in Sulfonated Castor Oil, Urea, Glycerine, Butyl Alcohol, and Water to Make Flowable Coating—Albert Luther James, Western Springs, Ill., to Corn Products Refining Co., New York, N. Y. No. 2,377,237. May 29, 1945.

Canadian Patents

Noodles Made In Continuous Method as Step In Continuous Procedure for Making Canned Noodle Soup—Philip Walburn Souder, Moorestown, N. J., to Campbell Soup Co., Camden, N. J. No. 426,859. April 17, 1945.

Cream With 70 Percent or Higher Milk Fat Cooled As Film In Continuous Manner—Richard J. Speirs, Cameron, Wis., to Abbotts Dairies, Inc., Philadelphia, Pa. No. 426,970. April 24, 1945.

Juice and Pulp Expressed From Quartered Citrus Fruit by One Cleated and One Corrugated Roll Operating As Expressing Unit, Enclosed in Vertical Housing Between Quartering Apparatus and Feed Shaft of Separator—Davis Allan Hyslop, Burlington, Ontario, Canada. No. 427,291. May 8, 1945.

Coffee Cake Made on Mechanical Unit—LeConie Stiles, Seattle, Wash. No. 427,309. May 8, 1945.

FOOD TECHNOLOGY

NEW DISCOVERIES AND INVENTIONS

DAIRY

Dried Milk Powder

SUBJECTIVE measurement of palatability was adopted as the most precise measure of milk-powder quality, after assessment of a number of objective tests. These tests were oxygen and water sorption of the powders; chlorophyll and peroxide oxygen values of the fat; browning of the powder; fluorescence values; changes in peroxidase, trimethylamine, volatile sulphur compounds and diacetyl content; solubility by centrifuging and by a potassium chloride solution method; titratable acidity; pH; congo rubin and iron numbers; foaming volume; coagulation by acid, alcohol and rennet; dielectric constant; color intensity and quality; refractive index; viscosity and surface tension.

When palatability was used as a measure of quality, powders stored at 100 deg. F. for 7 days were preferred to those stored at 80, 120, or 140 deg. The powders included spray-dried skim milk and whole milk prepared by a commercial processor and an experimental spray dried whole milk that had been pasteurized, condensed and dried at temperatures about 20 deg. F. lower than those used by the commercial processor.

It is possible that poor palatability at 80 deg. F. was the result of peroxidase or other enzyme action. That at 120 and 140 deg. storage may be the result of temperature effects.

Digest from "Dried Milk Powder. I. Methods of Assessing Quality and Some Effects of Heat Treatment," by J. A. Pearce, *Canadian Journal of Research*, vol. 23 F, 177-184, March, 1945.

Riboflavin Loss

Loss of riboflavin from milk through action of sunlight is not confined to direct exposure. Set out in quart clear glass bottles on a sunny summer morning, the loss in one test group amounted to 27 to 40 percent of the contained riboflavin in 2 hours of direct sunlight. Samples outdoors but in the shade lost less than 7 percent in the same period.

Brown glass and paper for containers afford some protection, losses for this group being under 2.2 percent in one-half hour, up to 5.6 percent in 2 hours and 5.3 to 6.6 percent in 6 hours. (One rectangular paper container gave results far above the average, reaching 16.9 percent in 6 hours. The figures given here omit this exception.)

Losses are not confined to direct sunlight. Pasteurized milk in clear glass bottles in a showcase 10 ft. from an east window lost 7.3 percent of its riboflavin. Milk cooked in a glass pan, or uncovered in aluminum, in a sunny kitchen, but not in direct sunlight, lost 11 to 12 percent in 30 minutes.

Digest from "Photolysis of Riboflavin in Milk," by O. E. Stamberg and D. R. Theophilus, *Journal of Dairy Science*, vol. 28, 269-75, April, 1945.

BACTERIOLOGY

Heat Activation

SUBLETHAL heating of the spores of many thermotolerant and thermophilic aerobes has a determining influence upon the number of spores which subsequently will germinate. Such heat activation has a bearing upon certain commercial or laboratory practices. For instance, when sublethal heating is used to eliminate vegetative cells from test spore suspensions prior to plating, the operator has unwittingly increased the accuracy of the count. As an example from commercial practice, forewarming was adopted to produce a satisfactory body in evaporated milk. As a result of forewarming at 95 deg. C. for 10 minutes the majority of the spores of thermotolerant species become heat labile during condensation and consequently are easily killed by subsequent processing.

Through heat activation, a spore population is able to attain a high percentage of germination at temperatures low enough so that only a small proportion of the total viable spores would germinate without the preheating. Where thermotolerant species are concerned, heat activation may bring the temperature of germination of the majority of the spores within the usual storage and distribution temperatures for canned foods.

This study of thermotolerant cultures isolated from outbreaks of spoilage in commercially processed evaporated milk, including flat sour types, showed that nearly all would respond to pregermination heating.

The proportion of spores responding depends on the amount of heat, the composition of the medium in which they are heated and the temperatures at which the spores are formed and subcultured. In the order of their effectiveness upon heat activation, heating mediums are 0.5 percent glucose or lactose, 0.5 percent peptone, skim milk, glucose nutrient agar, 0.3 percent beef extract, glucose nutrient broth, distilled water and 0.5 percent NaCl.

At 95 deg. C. the heat activating process was nearly complete in skim milk in 10 minutes, and entirely so in 30 minutes. Hence long-hold pasteurization must effect material activation of spores.

Recognition of this phenomenon and some understanding of the factors that affect it are essential to accurate enumeration of viable, sporing, theremotolerant and thermophilic aerobes.

Digest from "Heat Activation Inducing Germination in the Spores of Thermotolerant and Thermophilic Aerobic Bacteria," by H. R. Curran and F. R. Evans, *Journal of Bacteriology*, vol. 49, 335-46, April, 1945.

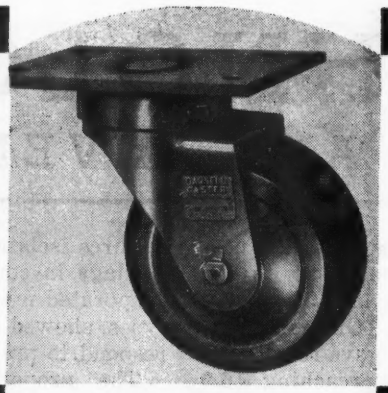
CEREAL PRODUCTS

Multiple Bleaching

REPEATED small dosages of a gaseous bleaching agent are much more effective in removing color than an equivalent amount of reagent added to flour at one time.

In laboratory batch bleaching, 4 to 8 lb. of flour was agitated slowly in a tumbling mechanism, with the gas applied gradually over a long period of time, so that the flour surface exposed to the gas was changing continually but slowly. Pilot scale tests, to simulate commercial procedure, treated 1 to 5 barrels of flour per hour flowing continuously through a small agitator. Results with these methods were compared to those of commercial equipment provided with more than usual accuracy of control.

The batch process accomplished the most effective bleaching, the



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commercial process was least efficient in utlization of the bleaching gas. This was thought to be due to the longer contact period in the batch equipment.

Partial pressure influenced bleaching efficiency with nitrogen trichloride, lower partial pressures giving better color removal until a point was reached beyond which no further improvement was noted. The partial-pressure range with nitrogen peroxide was limited by the equipment, and no better effect at reduced partial pressures was obtained.

To achieve lower partial pressures and longer contact of the flour with the reagent in commercial practice, it is recommended to distribute the same quantity of gaseous reagent between two agitators, each equipped with flour seals at the inlet and outlet ends, and to pass the flour through these in series.

Digest from "Multiple Bleaching of Flour. I. Bleaching Efficiency as Influenced by Flour Agitation and Optimum Utilization of the Bleaching Agent," by C. G. Ferrari, W. S. Hutchinson and D. K. Mecham, *Cereal Chemistry*, vol. 22, 101-12, March, 1945.

Edible Wheat Germ

BAKING and keeping qualities are improved and a palatable product is obtained when wheat germ is treated with steam or with ethylene dichloride vapors followed by steam.

Flavor loss or development of off-flavors in wheat germ is due to breakdown of the nonfat constituents. It shows no relationship to peroxide number or lipoxidase activity.

Preliminary tests indicated that moist heat treatment would be most effective in reducing proteolytic activity, but that drying under heat resulted in the best keeping quality. A combination of the two —steaming followed by dry heat in an oxygen-free atmosphere—yielded a product which kept fresh for at least a month in moisture-vapor-proof envelopes at 122 deg. F.

Ethylene dichloride vapor preceding a steam deodorization gave a good product but showed no advantage over steaming the wheat germ while agitating it to insure uniform results.

The treated germ, immediately after treatment or after storage, could be used in quantities up to 20 percent of the flour in biscuits with improvement in flavor and no damage to texture.

There was no loss in vitamin E from treatment or storage. Thia-

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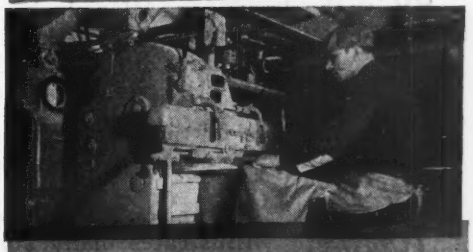

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mine values were not lowered. Treatment resulted in complete destruction of the oxidized form of glutathione, apparently carrying the oxidation beyond the dithioform. Reduced glutathione suffered a 25 percent loss. This averages to somewhere near 50 percent of the total glutathione.

Digest from "Studies on the Processing of Wheat Germ," by C. V. Lusena and W. D. McFarlane, *Canadian Journal of Research*, vol. F 23, 202-11, May, 1945.

FATS AND OILS

Stabilization Process

SLUDGES that collect on top of the condensed water after steam deodorization of edible oils are rich in antioxidants, according to a recently granted patent.

The patent covers the process of adding such a sludge to a shortening and hydrogenating the mixture. The hydrogenation may be followed, or preceded, by alkali refining.

The example given in the patent disclosure is for lard, to which 0.5 percent of crude cottonseed sludge containing 4 percent of tocopherol is added in an autoclave. A nickel catalyst is used, air is exhausted and hydrogenation carried on at 60 p.s.i. and 125 to 250 deg. C. with agitation. The product, when sufficiently hydrogenated, is cooled and filtered. A subsequent alkali refining is advisable to remove the last of the nickel catalyst.

The patentee suggests that the increase in stability by hydrogenating in the presence of the light sludge is due to removal of prooxidants, but no data support the statment that such substances have been found to be present.

Digest from U. S. Patent 2,363,672, issued November 28, 1944, on an application filed November 7, 1941, to J. L. Jakobsen, and assigned to General Mills, Inc.

QUALITY CONTROL

Water in Dry Foods

SPECIFIC for water, the Fischer method permits fairly rapid determination of the moisture content of typical dried foods.

This method is based on titration of a methanol suspension or solution with a complex reagent containing iodine and SO_2 dissolved in pyridine and methanol. The authors have adapted the method—with the electrometric procedure which avoids end-point difficulties for colored solutions—to starches, sugars, pectin, egg powder and a number of dehydrated foods.

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EVEN though direct government purchases have taken a considerable part of our multiwall paper bag production this year, Bemis customers have not suffered . . . they have been supplied on the basis of past purchases, even in the face of the labor shortage and no increase in facilities.

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For starches, sugars and pectin one-half hour contact with methanol at 60 deg. C. yields constant moisture values. Because solution times up to 6 hours do not always give constant values for carrots, beets, peas, sweet potatoes and orange powder, results must be calibrated against those obtained by an acceptable reference method. However, for practical purposes no method is known that gives a true moisture value for such materials. In general, those by the Fischer method are somewhat higher than by the vacuum-oven method using 38 hours at 70 deg. C. The considerable variation in moisture values for some of these vegetables with different contact times in methanol probably results from slow diffusion of moisture to the methanol and slow thermal decomposition.

Digest from "Determination of Water in Dry Food Materials," by C. M. Johnson, *Industrial and Engineering Chemistry*, Analytical Edition, vol. 17, 312-16 May, 1945.

MISCELLANEOUS

Gammexane

ONE of four known isomers of benzene hexachloride, chemically designated as γ 1.2.3.4.5.6. hexachlorcyclohexane, has been found significantly toxic to weevils, locusts, mosquitoes and house flies. Other isomers are relatively inactive.

The active principle, called "gammexane" for convenience, can be separated from the mixed isomers by fractional crystallization. It is chemically stable in the presence of light, hot water and natural waters containing ground limestone or chalk. Indications from tests on rats are that the isomers are not particularly toxic to animals, the γ-form least so. Gammexane is toxic to fish in concentrations above 1 part per million.

For insecticidal use, gammexane can be produced as a powder diluted with gypsum, in organic solution, as a stable emulsion with kerosene and an emulsifying agent, or as a powder dispersible with water. It can also be applied as a "smoke" by heating.

Since it appears to act simultaneously as a stomach poison, a contact agent and a fumigant, the speculation is introduced that it is a blocking agent for vital processes through its resemblance to the essential inositols in molecular weight and physical characteristics.

Digest from "An Insecticide with Outstanding Properties," by R. E. Slade, *The Chemical Age*, vol. 52, 243-45, March 17, 1945.

FORMULAS FOR FOODS

FORMULA NO. 541

Peanut Muffin Mix

Cake flour	10 lb.
Salt	8 oz.
Baking soda	8 oz.
Cream of tartar substitute	1 lb
Dextrose	1 lb. 4 oz.
Skim milk powder	1 lb. 4 oz.
Soya grits, not pulverized	2 lb. 8 oz.
Peanut butter	3 lb. 12 oz.
Molasses	10 oz.

Dry Mix

Sift the salt, leavening, dextrose and milk with 1 lb. of the flour, until well blended. Then sift through the remaining flour.

Blend the molasses and peanut butter. Add the flour mix and blend in the mixing machine until smooth. Sift. Add the grits and blend again.

Place in covered container or package for future use.

To Make Up

For each 8 oz. of the mix, add 1 egg and 6 oz. of water. Mix the egg and water together, then add gradually to the dry mix, stirring until smooth.

Half-fill greased muffin tins. Bake at 375 deg. F. for about 25 minutes.

Formula from Laura K. Track.

FORMULA NO. 542

Short Nougat

Sugar	50 lb.
Corn sirup	50 lb.
Full-fat soya flour	7-12 lb.
Egg albumen or substitute	2 lb.
Salt	8 oz.
Flavoring	as desired

Directions

Place 5 lb. of corn sirup in a nougat beater with the egg, having the beater in operation. Boil the sugar and the remaining corn sirup to the desired degree, usually about 270 deg. F., and pour this slowly into the egg mixture in the beater. Beat to the desired lightness.

Adjust the beater to slow speed and add the soya flour and salt. Mix well. Flavor and finish as usual.

Low-fat soya flour can be used if desired. This formula is suggested to increase the nutritive balance of the candy through introduction of soya flour. It should be regarded as experimental only, and thoroughly tested under proposed operating conditions before manufacture is undertaken.

Formula from A. E. Staley Mfg. Co.

FORMULA NO. 543

Salad Dressing I

A heavy-bodied stable emulsion of egg yolk, oil, spices, salt and sugar furnishes color, flavor, food value and richness of appearance to salad dressing. A starch paste, usually consisting of a special starch or starches cooked in a mixture of vinegar and water, contributes a tart flavor, body and bulk and a fine, smooth texture. The following suggestions represent good commercial practice, to be varied to suit manufacturing and market conditions.

Starch Paste

Water	16 lb. 8 oz.
Vinegar, 5 percent acid	10 lb.
Special starch	3 lb. 8 oz.
Granulated cane sugar	3 lb.

The vinegar and 10 lb. of water are brought to about 160 deg. F. in a steam jacketed kettle. Meanwhile, blend the starch to a smooth, free-flowing suspension with the remaining water.

Add the starch suspension only as rapidly as the agitator will disperse it. Continue agitation, at about 30 r.p.m., until the paste is clear and thick. (For uniform pastes and dressings cook each batch to temperature, with thermometer readings taken at a point midway from the center of the kettle to the wall.)

As soon as cooking is complete, add the sugar and mix thoroughly. If desired, 8-lb. of corn sirup or corn sugar may replace 2-lb. of cane sugar.

Cool quickly, at least to 80 deg. F., with slow agitation. It is not wise to prepare starch pastes too far in advance. Best practice is to cool to 80 deg. F. and use immediately.

Emulsion Base

Frozen egg yolk (10 percent sugar)	1 lb. 8 oz.
Granulated cane sugar	3 lb.
Salt	1 lb. 4 oz.
Dry mustard	4 oz.
Water	12 oz.
Vinegar, 5 percent acid	4 oz.
Salad oil*	10 lb.

*Preferably cottonseed or corn oil

Place the defrosted yolks in the bowl of the mixer with the sugar, salt and mustard sifted together. Blend. Add about one-third of the water and whip until light.

Begin adding oil and water or vinegar alternately. First add oil in a thin stream while whipping at high speed, adding the oil for 30 seconds and continuing whipping until a uniform mass is obtained. Next add a small amount of water, then more oil, working in each addition well. The quantity of oil added at one time may be gradually increased. Regulate liquid (water or vinegar) additions so that there is some available to finish the process. Temperature for emulsifying should be 43 to 45 deg.

This is the emulsion base suggested for a salad dressing with 20 percent oil in the product.

Final Blend

Emulsion base	17 lb.
Starch paste	33 lb.

Blend emulsion and paste in a power mixer until a fine, glossy, uniform mass is obtained. Overbeating will cause loss of body or the incorporation of large air bubbles, with consequent danger of rancidity through oxidation or slack-fill through settling.

Formula from National Starch Products, Inc.

FORMULA NO. 544

Irish Soda Bread

Flour, soft	12 lb.
Milk	3 lb 12 oz.
Salt	3 oz.
Soda	3½ oz.
Shortening	8 oz.
Sugar	4 oz.
Cream of tartar	7 oz.
Raisins	2 lb. 8 oz.

Directions

Mix to a smooth dough, taking care not to get the mixture too stiff. When nearly mixed, add the raisins. In mixing, be sure that the milk is cold. Adjust according to the strength of the flour.

Shape dough into flat disks, brush over with milk and egg wash. Cut a cross on top before baking at about 400 deg. F.

If scaled at 17¾ oz. for each loaf, this batch makes approximately 17 loaves.

Formula from Worcester Salt Co.

Why Is Metso A Safe Cleaner?

For food plant cleaning, it takes something more than active alkali content to make a detergent. Metso has that extra something—a safety factor.

Sure, Metso removes the solid dirt, grease and oil quickly. More than that, a special component in Metso (soluble silica to the chemist) protects sensitive metals. That's why equipment and utensils stay bright and shiny when they are cleaned regularly with Metso.

Philadelphia Quartz Co., Dept. D, 125 S. Third St., Phila. 6, Pa.
Sodium Metasilicate U. S. Pat. 1898707

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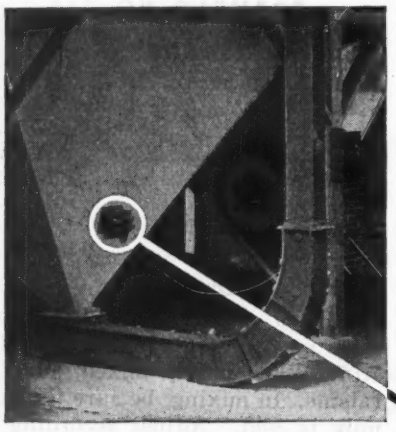

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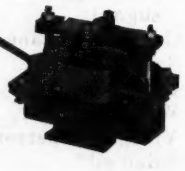

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SYNTRON COMPANY

460 LEXINGTON AVE. HOMER CITY, PA.

Canned Citrus Juices

(*Continued from page* 78)

Although added in a quantity considerably above that likely to be encountered in canned Florida orange juice,[7] levulose was found to have no perceptible deleterious effect upon the flavor or color of the juice during 15 months of storage at room temperature. Furthermore, in the tenth month of storage the levulose content of the sucrose-sweetened juice became nearly half again as great as the levulose content of the dextrose-sweetened juice, yet no off-flavors nor darkening was observed in the sucrose-sweetened juice.

When the sweetened juices were compared directly with the unsweetened control, they appeared to maintain more desirable flavor characteristics after extended storage than the unsweetened juice held under similar conditions. The masking effect of the added sweetness probably accounts for most of this difference. Dextrose appeared to be a satisfactory sweetening agent.

Ascorbic acid determinations were made periodically, and as might be expected, the sugars added to the juice had no perceptible effect upon the retention of ascorbic acid.

Dissolved Oxygen in Citrus Juices

The atmospheric oxidation of citrus juices during prolonged holding periods prior to enzyme inactivation has long been recognized as a cause of loss in flavor and in ascorbic acid. However, the rôle of atmospheric oxygen in orange and grapefruit juices canned by the current procedures of rapid handling has not been clearly defined.

Several series of oxygen and ascorbic acid analyses were run on orange juice and grapefruit juice without employing any deaeration. The juice was extracted on a commercial scale by mechanical extractors and collected in 100-gal. tanks prior to pasteurization. The oxygen content of the juice in the filled tank was found to average 3.8 c.c. per liter. The oxygen content of the juice gradually decreased during a holding period of approximately 20 minutes until, immediately prior to pasteurization, it averaged 1.3 c.c. per liter without any significant decrease in total gas content. Immediately after pasteurization, the oxygen content of the juice was less than 0.5 c.c. per liter. The total gas content of the juice decreased approximately 60 percent during pasteurization due to physical expulsion as foam.

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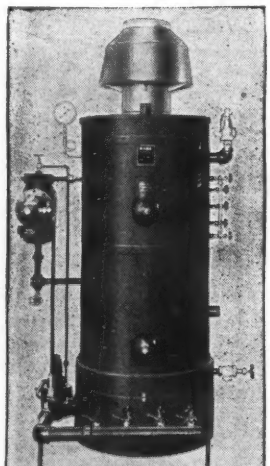

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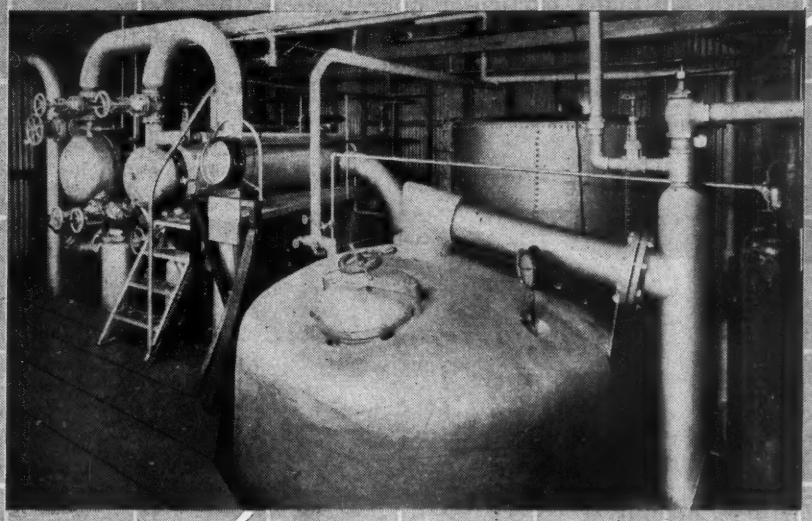
Therefore, a portion of the decrease probably was physical rather than chemical. Despite the apparent chemical reaction of the juice with atmospheric oxygen, the ascorbic acid content of the juice was not affected to a perceptible degree by the entire canning operation. The results of these tests are in agreement with data reported by Moore, Wiederhold, Atkins and MacDowell,[8] which showed that the ascorbic acid retention in Florida grapefruit juice canned commercially in 12 plants averaged 97 percent, indicating the loss in ascorbic acid during modern commercial canning to be insignificant.

In one experiment, a single batch of well-mixed grapefruit juice was divided into two portions, one of which was subsequently deaerated (deaerator efficiency, 92 percent), while the other was not. The flavor difference between the two canned juices did not become apparent until after a storage period of six months at room temperature. During the next eight months, the deaerated grapefruit juice maintained an increasingly superior flavor and color. However, at the end of the 14-month storage period the flavor difference had not become extremely pronounced. Ascorbic acid analyses (Fig. 5) indicated that the slightly greater retention of ascorbic acid in the deaerated juice during storage was too small to be of practical significance. The iron and tin content (Fig. 6) of the juice indicated that deaeration did not affect the reaction of the juice with the plain cans made of 1.5-lb. hot-dipped tinplate. Thus the deaeration of Florida grapefruit juice, although sufficiently advantageous from a quality viewpoint to justify its commercial use, appears to be only one of several factors involved in the production of quality juice. The physical advantages gained in production, i.e., increased pasteurizer efficiency and markedly reduced foaming in the filler bowl, are factors worthy of consideration. Some canners feel that these advantages alone are of sufficient importance to justify deaeration.

Headspace Oxygen

Several experimental packs of Florida orange juice and data accumulated from a large number of control analyses have shown that the volume of oxygen entrapped in the can headspace upon sealing in air is generally greater than the volume of air dissolved in raw juice. The effect of the displacement of this headspace oxygen with

Dowtherm on the job!



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We quote this enthusiastic indorsement not because it is extraordinary. On the contrary, it represents the general experience of hundreds of Dowtherm users who have found safe, precise, economical heat control in a variety of different industries. A few of the positive benefits these processors receive from Dowtherm are freedom from high-pressure hazards . . . uniformity and often improvement of product . . . savings in production and maintenance time.

The Dowtherm temperature range extends to 725°F. with corresponding pressures not in excess of 110 lbs. per sq. in. gauge. If this broad scope covers your own heating process, write to Dow for full particulars.

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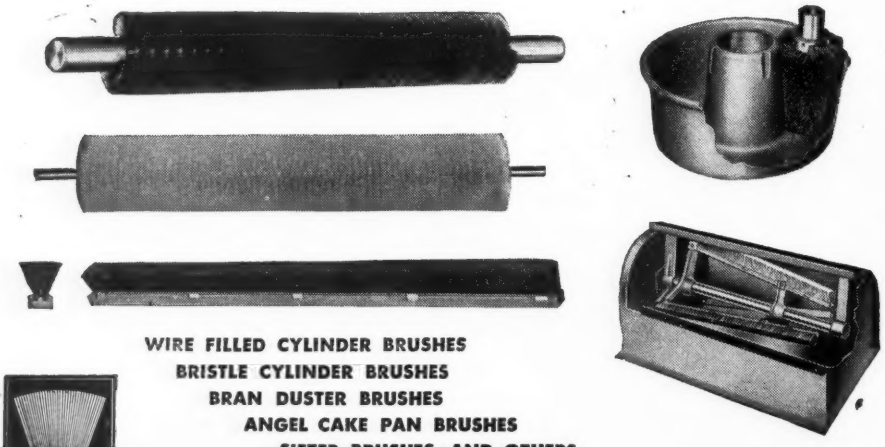

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an inert gas such as CO_2 or nitrogen by means of a special can sealing machine has been the subject of an extended study. The application of the gas-flow principle, coupled with efficient deaeration of the juice, reduced the total atmospheric oxygen in the can well below 0.10 percent by volume and thus prevented the loss of enamel adhesion in citrus enamel-lined cans (Lueck and Pilcher[3]). The effect of oxygen upon the lining of citrus enameled cans is so pronounced that no consideration can be given to the use of citrus enamel-lined cans for orange juice unless the initial oxygen content of the sealed can is consistently maintained below 0.10 percent by volume, and for this purpose the gas-flow principle is very effective.

The reaction of orange juice upon the tinplate in plain cans was considerably reduced by gas-flow closure, particularly during the first three weeks after packing, as indicated by a much brighter appearance of the interior of the can and by the lower tin content of the juice. After 17 days at room temperature, the juice closed under nitrogen contained 11 p.p.m. of tin, while that closed in air contained 41 p.p.m. After 13 months at room temperature, the two juices contained 30 and 60 p.p.m. of tin, respectively, indicating equivalent rates of corrosion after the first three weeks of storage. The ascorbic acid retention of the juice was found to be unaffected by the displacement of headspace oxygen.

The effect of the removal of headspace oxygen upon the flavor of both Florida orange juice and Florida grapefruit juice packed in plain cans was determined over a storage period of 13 months by panels composed of canners and others in the trade. When summarized, the divergent opinions expressed appeared to indicate that this method of closure has no appreciable effect upon the flavor.

Antioxidants and Flavor

Nolte and von Loesecke[9] reported that the petroleum ether-soluble material in aged, canned Florida Valencia orange juice had undergone oxidative changes with the creation of hydroxy acids and other decomposition products from the fats and resins, and that the former had become rancid. The evidence indicated that the gradual development of off-flavors over an extended storage period was due, at least to some extent, to oxidative changes. It has been found that the free

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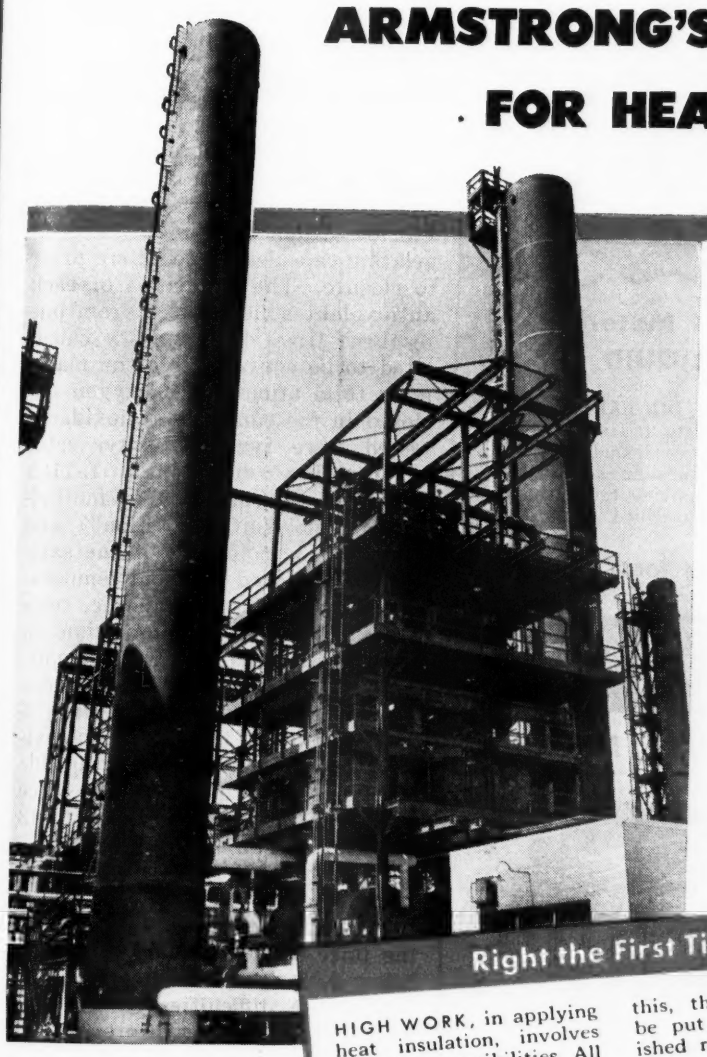

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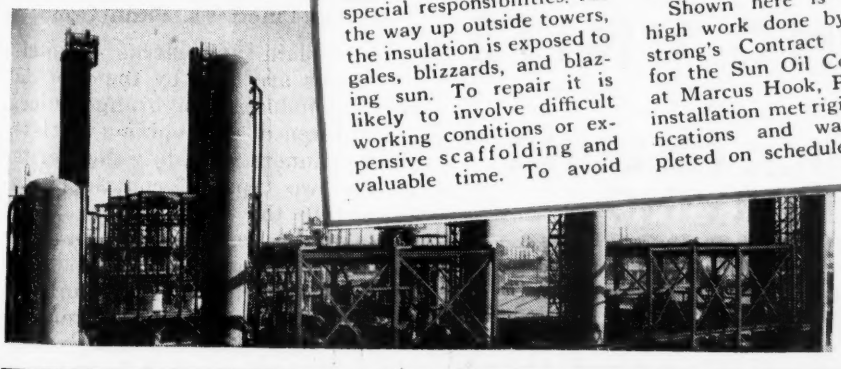
Shown here is typical high work done by Armstrong's Contract Service for the Sun Oil Company at Marcus Hook, Pa. This installation met rigid specifications and was completed on schedule.



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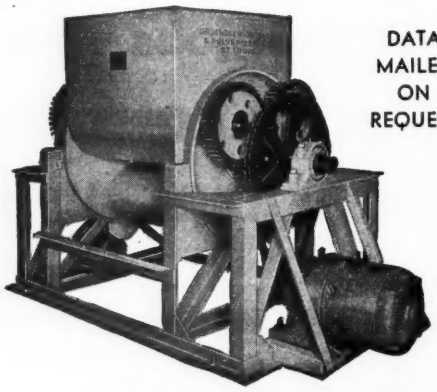

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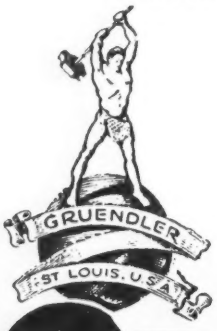

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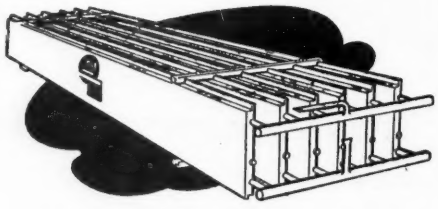

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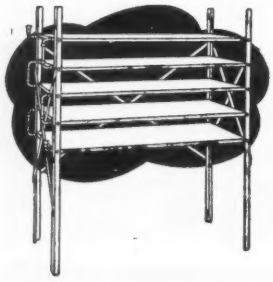

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oxygen in a can of orange juice, and in most other acid foods, gradually decreases to zero at room temperature within three to six weeks after canning. During this period, the flavor of the juice is not seriously impaired. Therefore, it would appear that the oxidative reactions which subsequently occur are due to secondary reactions or to some agent other than gaseous oxygen.

In an attempt to prevent these oxidative changes in flavor, several antioxidants were added to cans of Florida Valencia orange juice in gelatine capsules immediately prior to closure. The quantities of each antioxidant added varied from one to three times the quantity calculated to be equivalent to the maximum total atmospheric oxygen enclosed in the can. The antioxidants tested were tyrosine, butyl ester of tyrosine, du Pont's L-11-A ("Methyl Glucamine"), p-methylaminophenol sulfate ("Elon") and levo-ascorbic acid. All of the samples were stored at room temperature, and only organoleptic tests were made at each examination. In concentrations as low as 500 p.p.m., the butyl ester of tyrosine caused a pronounced off-flavor within 26 days. None of the other antioxidants tested had any perceptible effect upon the flavor of the juice during a storage period of 13 months. These results are in agreement with those reported by Nolte, Pulley and von Loesecke[10] on a similar test. The peel-oil content of the juice employed in this test was below 0.020 percent, thus avoiding one of the difficulties encountered by the above investigators.

Enamel-Lined Vs. Plain Cans

Both plain and citrus enamel-lined cans are used by the Florida canning industry for orange juice. A difference of opinion exists among canners regarding the merits of the two types of containers as related to the flavor of the juice during storage. Several carefully controlled experimental packs of Florida Valencia orange juice have been made to study this factor.

Distinctly different flavors develop in juices packed in the two types of containers, these becoming perceptible within the first three weeks after canning. Although this difference is not very pronounced, it is readily detected by direct comparison of samples. Members of the taste panels were definite and consistent in their preference between the two flavors, yet opinions were so evenly divided that, upon

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the basis of juice flavor alone, the choice of containers must be made by each canner after consideration of his own market. For all practical purposes, the ascorbic acid retention of juice packed in the two types of containers is essentially equivalent. It should be borne in mind that the visual appeal of the inside enamel lining to consumers must also be considered.

Acknowledgment

Direct contributions have been made to these investigations by the personnel of several canning companies, as well as by many other members of the American Can Co. The authors are grateful for this cooperation and regret that space does not permit individual acknowledgment of all the assistance rendered.

References

1. C. T. Parks, Prevention of Curd in Grapefruit Juice, *Canner*, vol. 90, part 2, 71-2, 1940.
2. H. J. Loeffler, Maintenance of Cloud in Citrus Juices, *Proceedings of Institute of Food Technologists*, 29-36, 1941.
3. R. H. Lueck and R. W. Pilcher, Canning of Fruit Juices—Technical Aspects, *Industrial and Engineering Chemistry*, vol. 33, 292-300, 1941.
4. Edward Ross, Effect of Time and Temperature of Storage on Vitamin C Retention in Canned Citrus Juices, *Food Research*, vol. 9, 27-33, 1944.
5. E. F. Cornell, C. H. Wells and C. M. Eguchi, private communication, 1938.
6. J. J. Willaman and S. S. Easter, Factors Affecting Color in Sorghum Sirup, *Industrial and Engineering Chemistry*, vol. 21, 1138-45, 1929.
7. J. A. Roberts, Composition of Citrus Fruit Juices, *Industrial and Engineering Chemistry*, vol. 29, 574-5, 1937.
8. E. L. Moore, E. Wiederhold, C. D. Atkins and L. G. MacDowell, Ascorbic Acid Retention in Florida Grapefruit Juice During Commercial Canning, *Canner*, vol. 98, 24-26, 1944.
9. A. J. Nolte and H. W. von Loesecke, Chemical and Physical Characteristics of the Petroleum Ether-Soluble Material in Fresh and Canned Florida Valencia Orange Juice, *Food Research*, vol. 5, 457-467, 1940.
10. A. J. Nolte, G. N. Pulley and H. W. von Loesecke, Experiments With Antioxidants for Preventing Flavor Deterioration in Canned Orange Juice, *Food Research*, vol. 7, 236-243, 1942.
11. O. A. Bessey and C. G. King, The Distribution of Vitamin C in Plant and Animal Tissues and Its Determination, *Journal of Biological Chemistry*, vol. 103, 687-698, 1933.

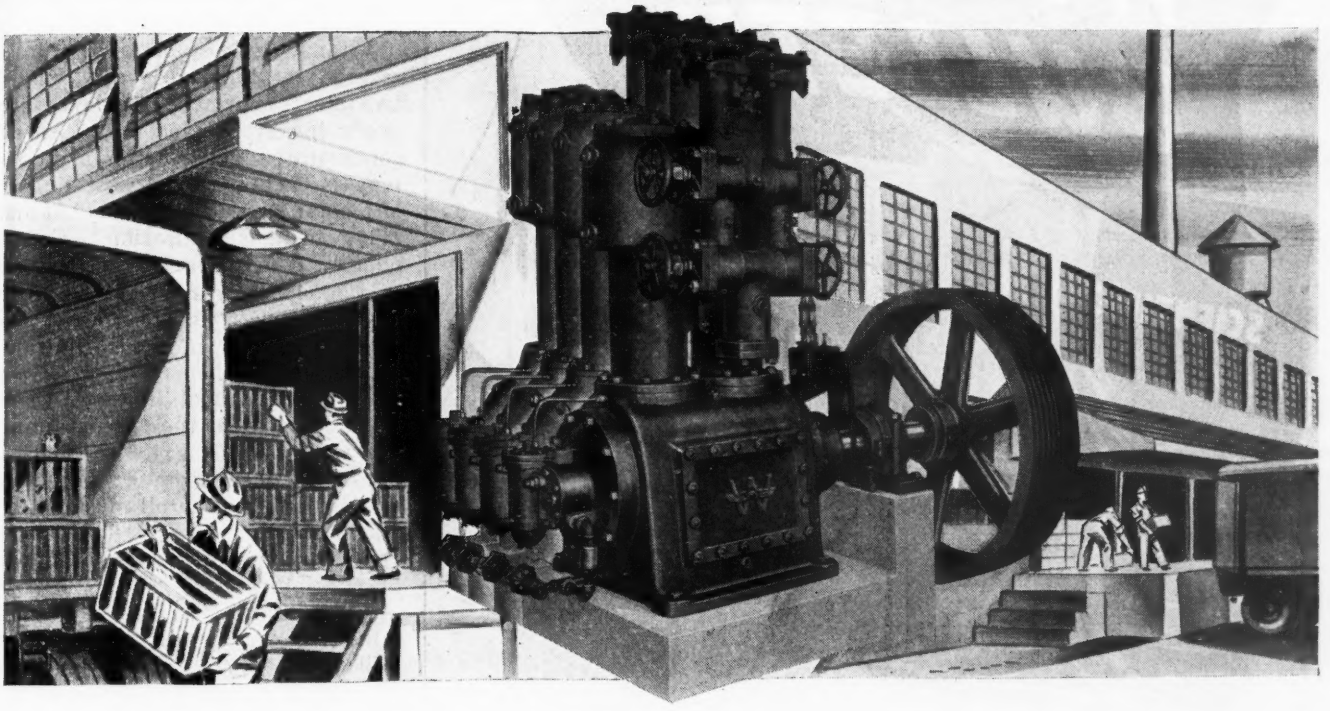
—End—

Adding Vitamin D

(*Continued from page* 95)

evaporated milk, can be measured out and introduced into the flow line at any given moment. This practice is possible, providing the milk to which the vitamin factor is added is directed only to a given storage holding-vat and the extent of increase in volume resulting from standardization is limited to a very low figure—such as 1 percent or less. Most evaporated milk plants, however, would find this

-35°F. . . -10 TO 0°F. . . 9 TO 10°F. . . 30°F.
AT THE SAME TIME FROM THE SAME SYSTEM



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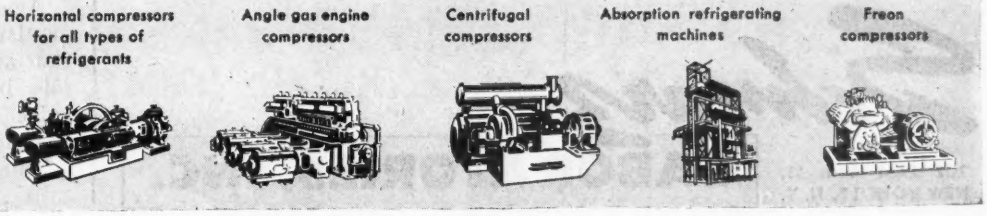

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procedure more or less unreliable. The volume of fluid whole milk received may be variable. The total volume of finished evaporated milk is usually variable within limits and generally sufficient to require the use of more than one storage tank for the evaporated milk.

Vitamin D is stable at the processing temperatures and under treatments normally employed for producing evaporated milk. An oil concentrate of the vitamin factor may be added to the flow line at any point where the milk is hot and prior to homogenization. Consequently, it may be added to the milk in a batch forewarmer (if these are used), through the bleeder of the vacuum pan, or in the surge tank supplying the homogenizer. Even in these procedures, however, there is risk of loss of the oil containing the vitamin D due to its floating out and adhering to drying films of milk solids. The oil must not be added as such to cold fluid whole or evaporated milk because of lack of miscibility.

A small batch mixture of vitamin D in oil homogenized in evaporated milk can be made in the plant and this mixture used subsequently for the fortification of large quantities of standardized finished evaporated milk. By arrangement, a mixture of a known quantity of the oil carrying vitamin D, mixed in hot evaporated milk, can be run through a homogenizer. When diverted and collected in a container, the volume or weight can be brought to a known quantity in which the concentration of vitamin D will be known. This small batch mixture of vitamin D homogenized in evaporated milk can be used for the fortification of the finished bulk standardized evaporated milk in various storage tanks. If a quantity of 10 gal. of the mixture is prepared, the amount necessary for the fortification of the milk in a given storage tank need only be of the magnitude of from 1 to 5 gal. This procedure, however, requires the supervision of a laboratory man. Recognition of the probability of error from losses or inadvertent effects might be wanting in the hands of an unsympathetic workman.

Dispersing Agents Fail

Available on the market are emulsifying or dispersing agents that are miscible, or nearly so, with oils in which vitamin D is dissolved. When mixed with the oils, the dispersing agents cause them to disperse very satisfactorily in milk or water. However, the dis-

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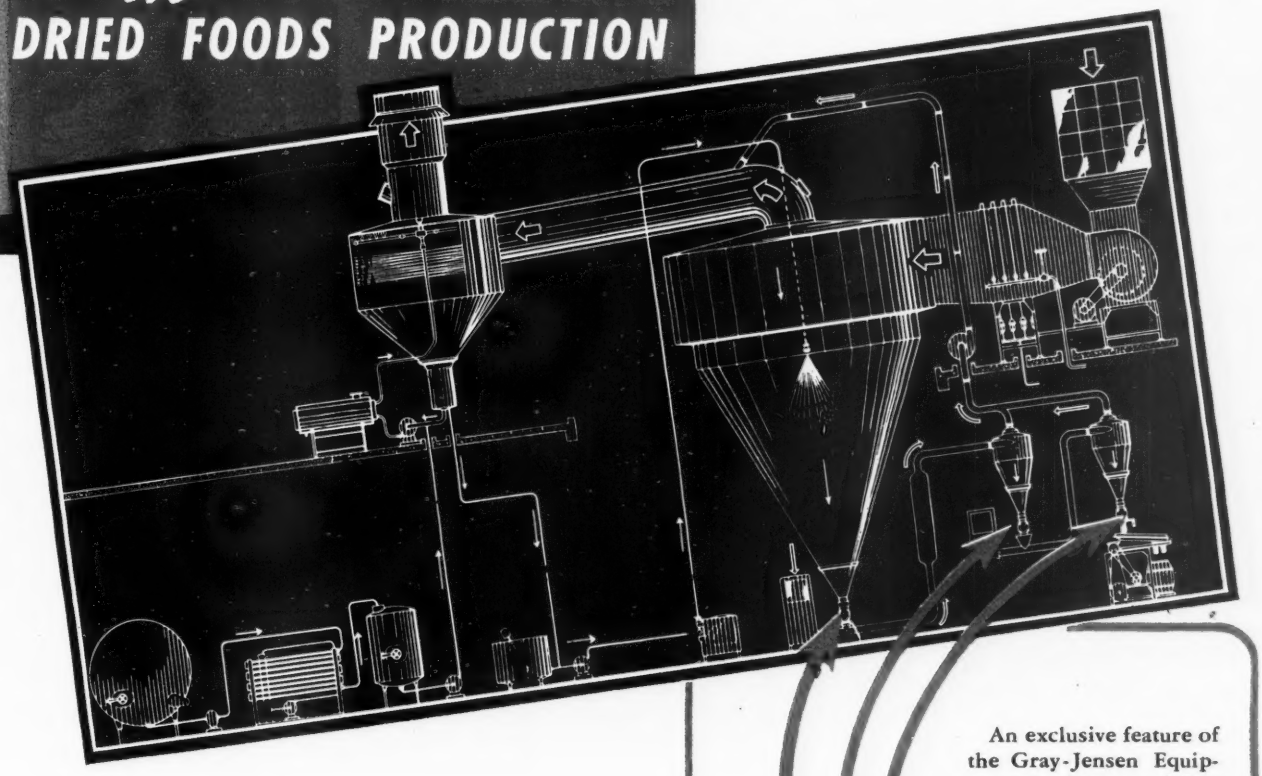

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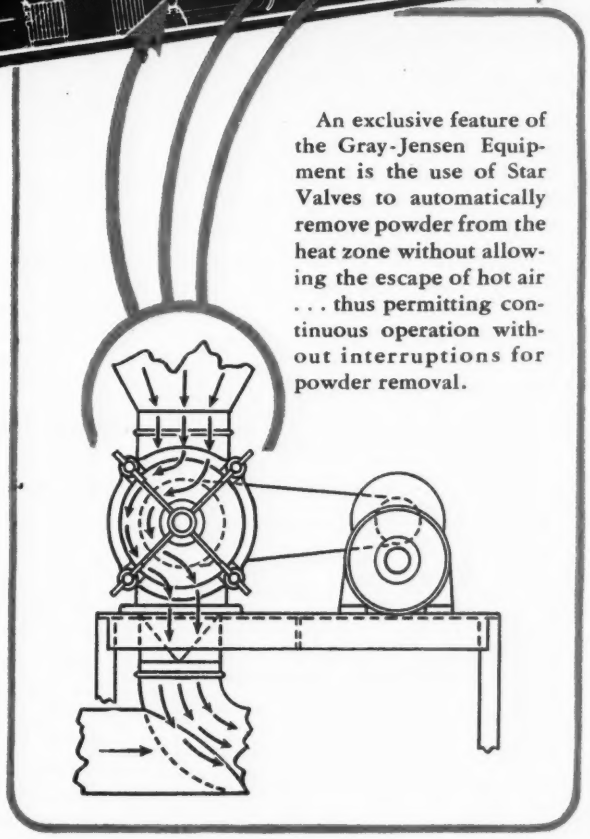

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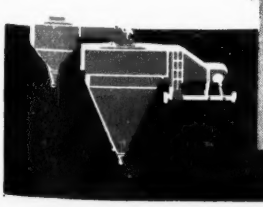

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persion in many instances is of a temporary nature. It appears, in any event, that the standards of identity for evaporated milk preclude the use of dispersing agents for this purpose.

Assurity of Fortification

The volumes of evaporated milk collected in storage tanks as the result of a day's operation represent a significant investment of immediate capital. Proper and efficient fortification with vitamin D is as important as the maintaining of other standards which the label on the final container represents. The addition of concentrates of vitamin D to the milk during the process of manufacture, prior to its reaching the storage standardizing tanks, involves the element of risk due to losses and misapportionment.

The simplest and most direct control of the process of fortification, particularly in plants having a multiplicity of storage tanks, is by the direct addition of the vitamin D factor in measured volumes to the finished standardized evaporated milk. This places the responsibility for the fortification in the hands of the laboratory management, which regularly must pass on the final standardization of the product for legal composition. Relatively permanent dispersal of the vitamin D factor in the finished canned product is necessary in view of the abuses to which the product is ultimately subjected in commercial trade channels.

—End—

Sweet Potato Concentrate

(*Continued from page* 99)

to agglomerate into large curds, decanting the clarified liquid from the sedimented coagulum, removing excess water from the curdy coagulum by suction filtration, with a final drying of the coagulum at 65 deg. C. The dried coagulum contains about 50 percent crude protein. At the present time others in this laboratory are conducting investigations to develop practicable means for recovery of this protein as a byproduct of sweet potato starch manufacture.

Experimental Results

The results of a typical experiment with Porto Rico sweet potatoes are given in the table.

It will be noted that 46 percent of the original carotene was in the coagulum, although that fraction

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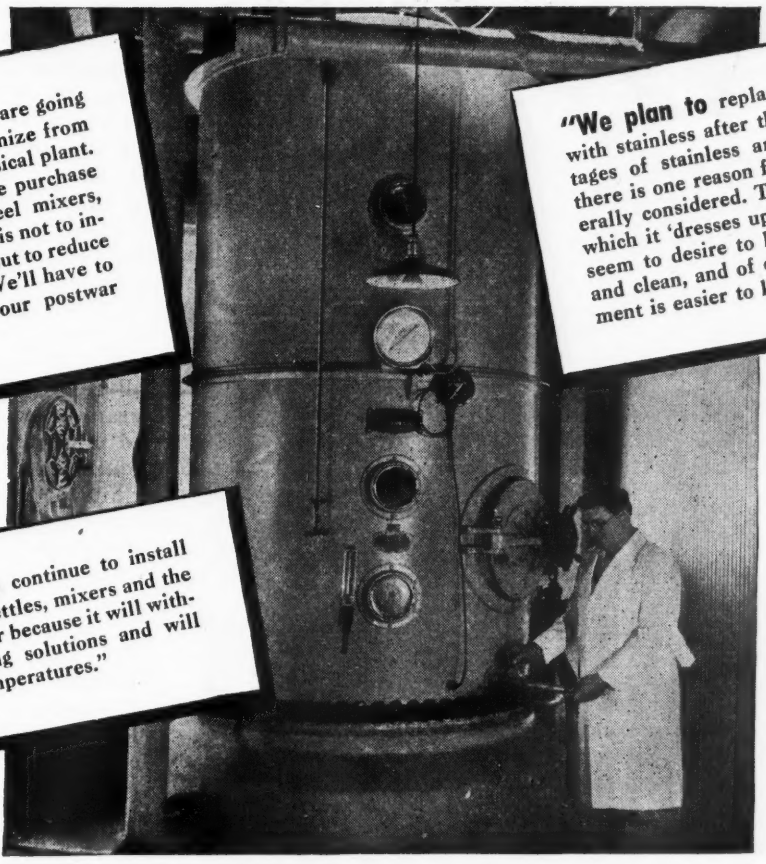

"After the war we are going to replace and modernize from 10 to 15% of our physical plant. This will involve the purchase of new stainless steel mixers, etc. We are doing this not to increase production, but to reduce production costs. We'll have to do this to meet our postwar competition."

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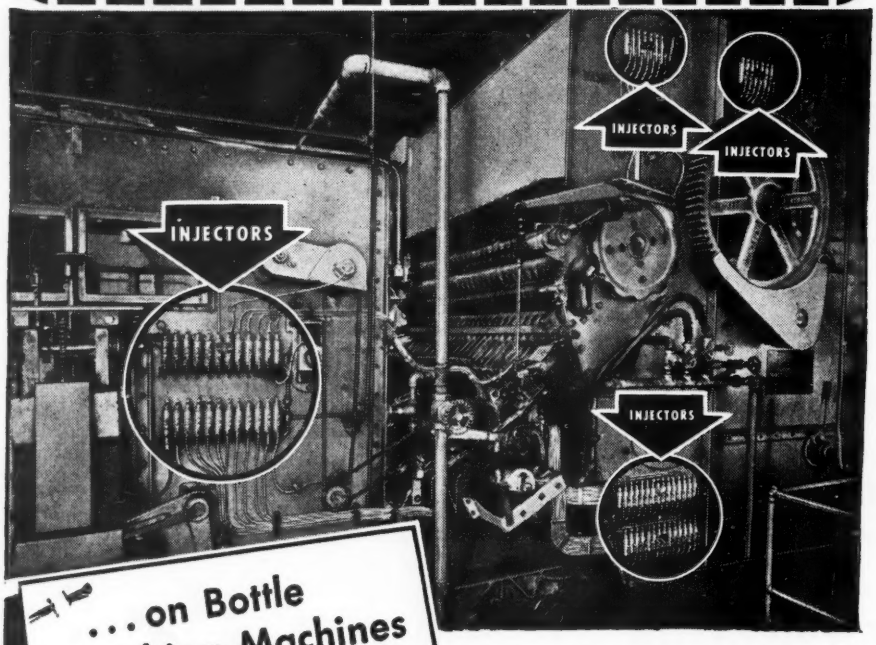

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weighed only 2 percent as much as the original sweet potatoes. The concentration of carotene in the coagulum was, therefore, 23 times as high as in the sweet potatoes. Investigations are being continued towards a more complete recovery of the original carotene.

On the basis of these data 100 lb. (45.4 kg.) of Porto Rico sweet potatoes containing 37.8 mg. carotene per kilogram would yield 0.91 kg. of coagulum containing 0.78 gram of carotene. Since practically all of this is beta carotene, the 0.78 gram of carotene might be expected to have a potency approximately equivalent to 1.3×10^6 International Units of vitamin A. By definition, 0.6 microgram of beta carotene is equivalent to 1 International Unit of vitamin A, or 1 gram of beta carotene equals 1.67×10^6 I.U. In other words, in terms of the generally accepted human requirement of 5,000 I.U. of vitamin A per day, the coagulum from 100 lb. of these Porto Rico sweet potatoes would contain an amount of carotene potentially adequate to supply the entire vitamin A requirement of one person for about 250 days. Sweet potatoes of this variety often show a higher carotene content than the material used in the experiment cited.

It should be emphasized that practical application of this method for concentration of carotene would be most economical when carried out in conjunction with the processing of high-carotene sweet potatoes for starch and feed, for fermentation, or for other products.

Equipment

Since these observations on the concentration of carotene were incidental to investigations on recovery of byproducts from sweet potato starch factory wastes, and are still incomplete, the primary object in publishing this brief article is to call attention to the concentration of the carotene in the fruit water coagulum, because of the current interest in carotene concentrates.

The problem of separation and recovery of the fruit water coagulum on a plant scale is not a simple one. Sufficient experimental data on which to base recommendations as to the most effective type or design of the specific equipment units to be used are still lacking. However, the processing steps are indicated on the flow sheet.

Following the initial grinding, for which a hammer mill is suitable, high-speed shaker screens are

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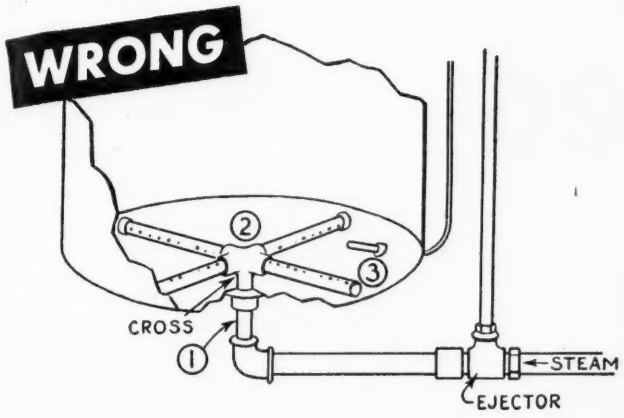
WRONG

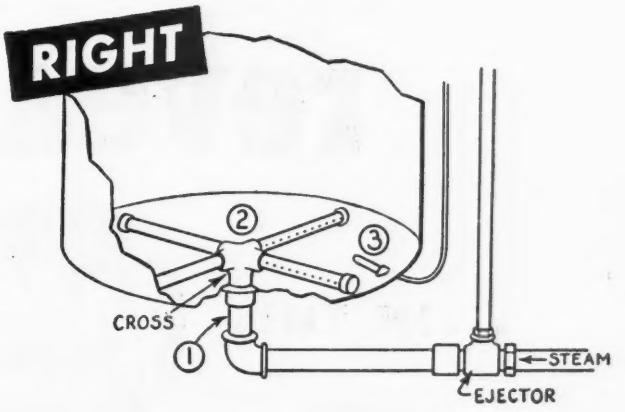


1 The line between the ejector and the retort is restricted by a small pipe where the steam and air should enter the retort. The steam still goes in but the back pressure in the line at the ejector is so great that air is not drawn from the top of the retort. Result: no air circulation during the cook; heat stratification in the retort; outside jars overcooked or inside jars not sterile.

2 Some holes in cross plugged. Others oversized due to corrosion. Holes in cross pointed in random fashion and one cap off. If air were introduced into the retort, the circulation would be erratic. The steam which enters is not evenly distributed—cold pockets and hot spots will exist. Near the end of the cook when the steam flow is low the retort water will run back into the cross and result in water hammer, vibration and scratched caps.

3 Bulb too close to incoming steam. It does not measure the average temperature of water at bottom of retort.

RIGHT



1 The line on the downstream side of the ejector large enough to prevent excessive back pressure with large steam flow; adequate air circulation throughout retort; stratification of retort water minimized.

2 Steam cross properly made and maintained. Water circulates in a clockwise direction due to the steam injection. 128 3/16" holes in cross insure adequate area to prevent excessive back pressure—yet prevent vibration and water hammer.

3 Bulb 75 angular degrees away from steam jets in cross. It measures the average temperature in retort bottom, yet quickly senses temperature changes.

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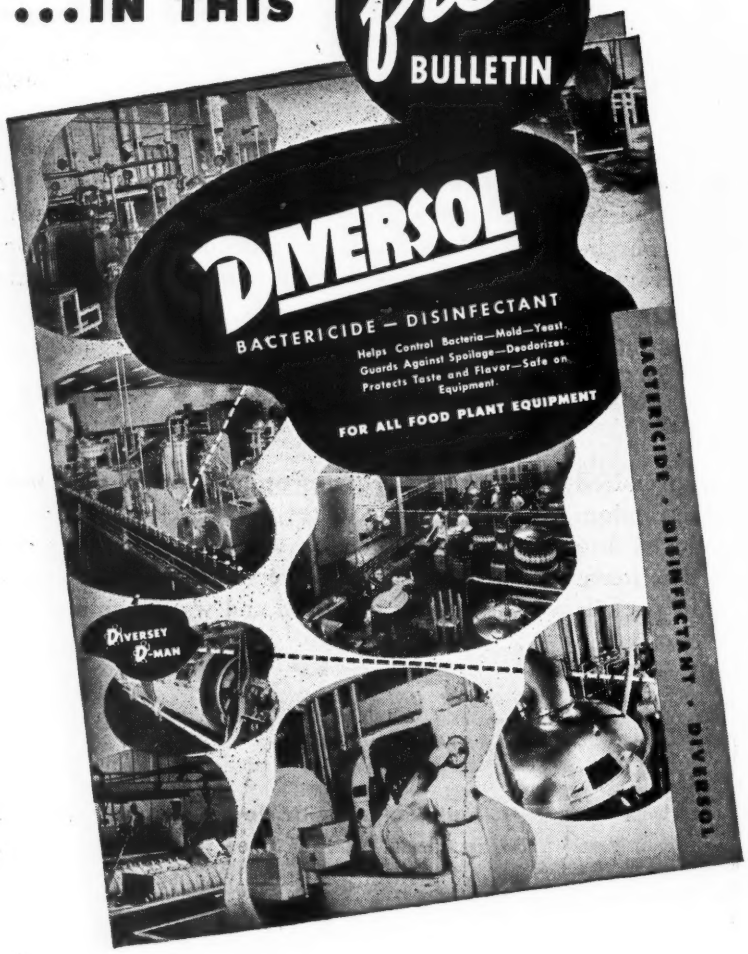

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most commonly used in starch manufacture, but liquid screens of the circle-throw vibrator type are coming into the picture for this purpose.

A settling tank is appropriate for the first stage of separation of starch from the crude starch milk, but a conventional settling tank does not perform as well on the coagulum after acidifying and heating. A conical settler operating continuously seems more promising.

The most satisfactory method of thickening or dewatering the partly thickened coagulum is yet to be determined. In the processing-step-flow sheet, a filter or centrifugal is indicated. Conventional vacuum drum filters or filter presses do not work with this material, although filtration with very slight pressure does fairly well on a small scale.

When the coagulum is reduced to a cake in a centrifugal, a vacuum dryer would be recommended to minimize destruction of carotene. Alternatively, a spray dryer might be considered for handling the partly thickened coagulum from the settling unit or the material after further thickening in a high-speed continuous centrifugal.

It must be recognized that the flow sheet as here presented is based on laboratory results. The process has not actually been tried on an integrated plant scale.

References

1. J. F. Villere, D. C. Heinzelman, J. Pominski and H. R. R. Wakeham, *Food Industries*, vol. 16; page 76, 1944.
2. Since completion of this report, U. S. Patent No. 2,348,443 was granted to H. M. Barnett on May 9, 1944. This deals with the preparation of a carotene concentrate from carrots by utilizing a somewhat similar principle.

—End—

Mistakes with Lecithin

(*Continued from page* 75)

and lecithin is too lengthy for this article, but one illustration can be given. Softness of a loaf of bread, for instance, is increased by the addition of shortening, by virtue of the latter's consistency, and because of its distribution through a mass which otherwise would become hard by the firm setting of its solid constituents and by moisture loss. The softness attributable to lecithin has nothing to do with its bulk, but stems from its effect upon increasing the extent of both shortening and moisture dispersion, and by binding the two in an emulsion

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from which the moisture can not as readily infiltrate and evaporate. Therefore, no matter how little or how much shortening may be used, lecithin will improve the quality.

7. It is a mistake to attempt to replace the emulsified types of shortening with regular hydrogenated shortening and lecithin. The principle advantages of the emulsified type of shortenings over regular hydrogenated types is the ability to increase the moisture content of the product. The extent to which moisture content can be increased by the use of lecithin with any type of shortening is negligible. What the lecithin does do with both types of shortening, however, is to reduce the rate of evaporation of whatever moisture is present in the finished baked product. Here again, the attributes of emulsified types of shortenings and lecithin do not conflict with nor replace each other, but are additive.

8. The practice of basing the optimum quantity of lecithin used in bakery products on the amount of shortening used is usually the correct method, but it falls short in the cases of bread, rolls and any other bakery products with relatively small shortening content. The result is that lecithin is sometimes adjudged ineffectual in these products.

Unfortunately, we do not fully understand precisely just what does happen between lecithin and the gluten in flour when sufficient lecithin is used to make the effect noticeable. The effects are definitely present, however, when from 2 to 3 oz. of lecithin per 100 lb. of flour is used. The mistake here, then, is one of underuse.

9. When applying lecithin to cakes, it must be remembered that more than a strictly oil-in-water type of emulsion is involved. If lecithin is added at the beginning of the mix with the shortening and sugar, the viscosity is reduced to the point where less air can be whipped in, with the result that volume is lost. The lecithin should instead be added after all desired volume is obtained, and just before the last cut-back of water is added. In this way the air already whipped in can be held and no volume lost.

Even when the lecithin is added at the correct time, however, overuse can again cause volume reduction. Depending upon formulation and processing, the correct lecithin range is from 1 to 2 percent of the shortening used. The precise level must be determined for each formula. The first symptom of overuse

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Acetone	Brass, Copper	Special Bronzes, Stainless	Copper
Air	Iron, Steel, Brass	" "	Iron, Steel, Brass, Copper
Alcohol	Iron, Steel, Brass, Copper	" "	" " "
Ammonia	Iron, Steel, Ni-Resist, Brass, Bronze, Stainless, Monel	" " "	" " "
Aniline Dyes		Monel	" "
Beer		Stainless, Monel	
Brine			
Calcium Chloride			
Carbon Tetrachloride			
Carbonic Acid			
Calcium			

MATERIAL SPECIFICATIONS (METALS AND ALLOYS)

Darling Designation	Nearest A.S.T.M. Specifications	A.S.T.M. Specifications	Type or Name of Metal or Alloy	Form in Which Used	PHYSICAL PROPERTIES: Tensile Strength P.S.I.	Yield Point P.S.I.	Elong. in 2" %	Reduc. of Area %	Brinell Hardness	USES
Daraloy 437		B59-39 Grade A	Special Aluminum-Bronze	Castings	80,000	45,000	18		90	Valve stems, yoke stem nuts, disc facing, pressure castings, hydrant parts, seat rings, etc.
Al.		B26-37	Aluminum	Castings	20,000	7,000	5			Valve parts for certain corrosive services.
		B89-40		Bar Stock	35,000	9,000	16	40		Valve stems for certain corrosive services.
ular			Bolting Material, Regular	Headed Bolts or Studs	60,000	45,000	18	45		Ordinary service
		A96-39	Bolting Material,	Bolt Stud	125,000	105,000	16	50		High temperature and high pressure service.

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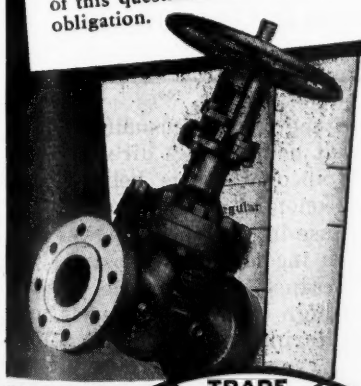
C—Monel, Darling 96, 97, 302, 410 and 437 Alloys.
D—Aluminum

Pattern	Regular Rating	Page No.	Alloy Group	SIZE OF VALVE, in Inches: ¼	⅜	½	¾	1	1¼	1½	2	2½	3	4	5	6	8	10	12
				Alloy Rated Service Pressures in lbs. per sq. in. at 100° F.															
IRON BODY GATE VALVES	25 lb. Steam		A B C D											50 125 125 40		50 125 125 40	50 125 125* 40	50 125 125* —	
	125 lb. Steam		A B C D											150 200 200 100		150 200 200* 100	150 200 200* —		
	175 lb. O-W-G		A B C D											175 200 200 —		175 200 200* —			
	200 lb. O-W-G		A B C D											200 200 200 —		200 200* —			



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is loss of volume in the mixing bowl.

10. In biscuits and cookies, both hard and soft, errors of both overuse and underuse are made. The use of more than 2 percent lecithin, based on shortening weight, is eneffectual and wasteful where the doughs are not sticky with that concentration of lecithin.

Where doughs contain exceptionally high quantities of sirups or molasses, however, the use of 2 percent of lecithin, based on shortening weight, is insufficient to remove stickiness. So the lecithin concentration must be increased up to 4 percent of shortening weight.

11. The most frequent mistake made in applying lecithin to pie doughs is the failure to reduce mixing time sufficiently, particularly after the water is added.

Failure to reduce mixing time, short as it already may be, will result in the overdistribution of the shortening in the dough. This, in turn, will cause the production of a very tender mealy dough, but will at least partially destroy flakiness.

Flakiness can be increased by the use of lecithin if dispersion is not forced during mixing, but is allowed to take place in the oven where the lecithin will cause the formation of thinner and more frequent layers of fat.

Part II, which will be published in the August issue, of FOOD INDUSTRIES, *will discuss mistakes made in using lecithin in cooking oils, lard, shortening, margarine, mayonnaise, peanut butter, sherbets and ice cream mixes. There will also be a table showing how lecithin is used, and why, in 32 food products*— THE EDITOR.

—End—

Factors in Consumption

(*Continued from page* 83)

tion of the families usually having candy at home varies directly with family income. It is believed, by some economists, that there will be a decrease in purchasing power and national income in the postwar period because maintenance of the record-high real income levels, obtained during the war, will be difficult. If this be so, a decrease in the demand for candy and similar foods might be anticipated after the war, insofar as the income effect is concerned. However, it is currently estimated that by 1950 the national income will be close to 140

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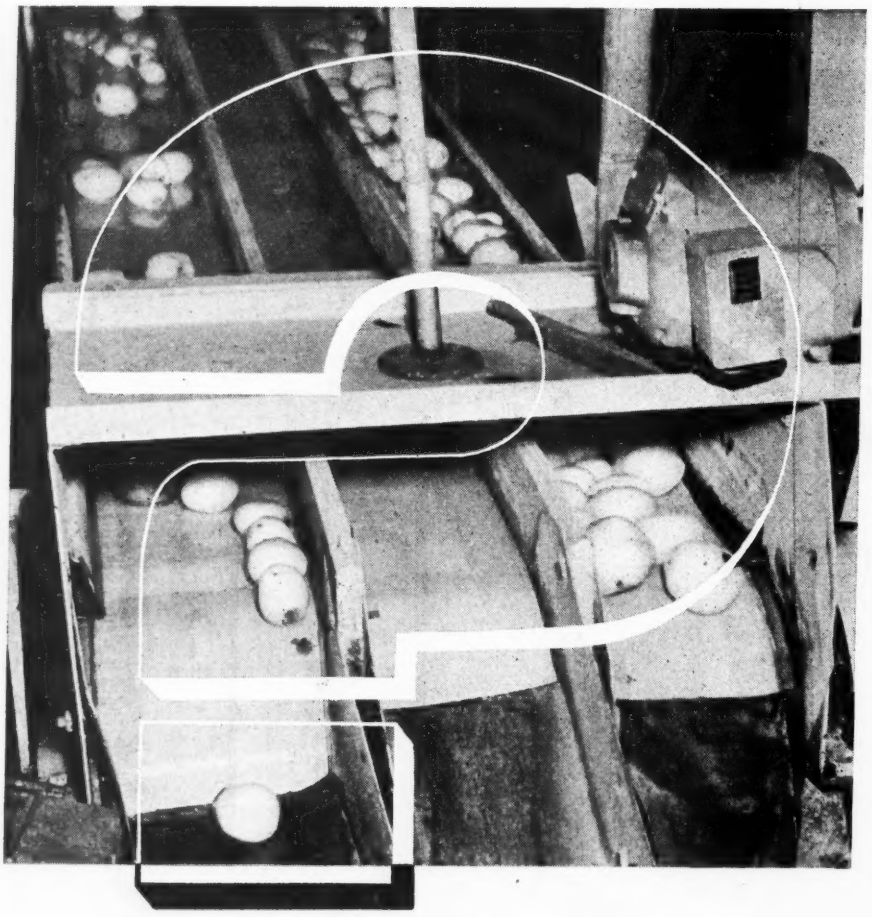

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billion dollars. Therefore, after the initial slackening in demand, the dollars and cents volume of sales should revert to the high levels observed during the past three years.

Candy consumption seems to vary directly with the number of gainfully employed people. A statistical analysis showed that the degree of association between the average annual per capita candy consumption in the United States and the index of industrial employment in the 1929-43 period, as measured by the coefficient of correlation was 0.96 (perfect association is 1.00). This shows that the candy sales curve parallels the trend in industrial employment.

To determine the changes in candy consumption, independent of changes in the number of gainfully employed, the annual consumption data for the 1929-43 period were adjusted for the variations in industrial employment. In this 15-year period, the adjusted average consumption was 15.75 lb. and the trend in per capita candy consumption varied but little, increasing at an average rate of 0.0075 lb. per person per year. So it follows that if the trend continues at the same rate, all other things remaining the same, per capita consumption (independent of the influence of the changes in employment) will increase 0.04 lb. in the first five years after the war.

The volume of employment has reached such high levels that it cannot be expected to be exceeded in the postwar period, especially during the reconversion period. It therefore appears that per capita consumption of candy, beverages and kindred foods has reached a peak insofar as effect of employment is concerned. In fact, a decline in candy consumption might be expected in the postwar period if the total number of gainfully employed decreases.

Consumption of confections and beverages appears to be more responsive to changes in the national income, employment, birth rate and the average age of the population than does the consumption of most other foods. This suggests that the production facilities of these industries, which are presently being used to capacity, might be partly idle in the postwar period.

Intelligent distribution and merchandising programs, based on a thorough familiarity with the factors affecting consumption, could, to a large degree, strengthen the relative position of these industries.

—End—